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# The Detection of Small Color Differences in Dyed Textiles

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**The art of dyeing textiles is one of extreme antiquity and its development closely parallels that of civilization. If one inquires into the technique used by the dyer in making a color match, it is found that the methods are largely intuitive and that the dyer is guided chiefly by his many years of experience. During this time he has been able to set up an arbitrary scale of color values in terms of the concentrations of the dyestuffs with which he is familiar. The development of new color measuring instruments within the last few years has provided a tool which should prove very effective in the hands of a trained dyer and should materially assist him in meeting the ever-increasing pressure of competition.**

THERE is little question that the trained human eye is a very sensitive mechanism for the detection of small color differences. Thus a dyer confronted with two yellow swatches may describe one of them in a qualitative way as being redder than the other, even when the difference is very slight. He may even indicate the degree of the difference in a quantitative way by stating the difference in the amounts of the dyestuffs used. It can be seen that with this system each dyestuff or combination of dyestuffs must be considered as a special case, and the scale of color values established for one such case cannot possibly be extrapolated to include mixtures of different dyestuffs. In other words, a dyer is unable to predict accurately the color that will be produced by mixing two dyestuffs if he has not already made a scale of mixture values for these materials.

The reason so many arbitrary scales of color values must be established is that each scale is made in terms of the chemical composition of the dyebath rather than in the purely physical measurements of the color itself. The eye is not an analytical instrument and is therefore unable to present its observations in any fundamental units. The process of color perception is a process of integration and, as is generally appreciated, the color of an object is determined not only by the characteristics of that object but also by the quality and quantity of the light with which it is illuminated. If this illumination is altered, the object may appear to the eye to have a different color, whereas, in truth, its fundamental characteristics have in no way been changed. It should be apparent then, that some analytical method must be employed that will give an unqualified representation of the characteristics of the object alone. The instrument for so measuring the reflectance of materials is known as a spectrophotometer, or color analyzer, and is designed to measure the amount of light reflected from the colored object at each wavelength of the visible spectrum. The spectrophotometric method not only provides a wealth of information that can be secured in no other way but it is so fundamental that the results obtained with it can be readily translated into the more familiar terms of dominant wavelength, purity and brightness, or for that matter into any other terms that may be found convenient. One is naturally prompted to ask why the spectrophotometer has not found a more general use in that most likely field, the dyeing of textiles. The answer to this is probably to be found in the fact that in the past all such measurements had to be made with a visual spectrophotometer. To obtain a complete spectrophotometric curve in this manner requires considerable time and patience. Furthermore, the data may be of questionable accuracy especially in the blue and violet portions of the spectrum because of the difficulty in making settings in this region. The development of a rapid recording photoelectric spectrophotometer at the Massachusetts Institute of Technology by Professor Arthur C. Hardy has provided a means of obtaining the

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necessary spectrophotometric data with adequate precision and in a matter of only a few minutes. It was in the belief that sufficient data to throw more light on the important problem of textile dyeing might be obtained with this color analyzer that this program of research, of which this paper is a part, is being sponsored by the Textile Foundation.

In spite of the general recognition of the fundamental validity of the spectrophotometric method of color specification, C. Z. Draves[1] has concluded that the human eye is a better judge of small color differences than a visual spectrophotometer. Since this entire program is based on the use of the spectrophotometric method, it seemed necessary to establish at the outset that his conclusions do not apply to photoelectric spectrophotometry with an instrument of suitable design. Draves' conclusions were based on experiments which consisted in dyeing swatches of wool with a yellow dye, and with a mixture of yellow and red dyes. The percentage of yellow dyestuff was maintained constant in every case while the amount of red was varied. Draves found that he could perceive color differences between the various swatches with his eye that did not show up in his spectrophotometric analysis. Since he confined his determinations of reflection to only one wavelength, it was felt that his conclusions needed further investigation.

The dyeings made in the experiments reported herein followed as closely as possible those described by Draves, and the spectrophotometric curves were made with the recording spectrophotometer previously mentioned. This will be described in more detail in a paper by Hardy, and only a brief summary of its operation will be given here. Light from a tungsten lamp is dispersed into a spectrum by means of a double monochromator, and a narrow spectral band is allowed to enter the photometering system. The latter consists of a set of three polarizing prisms, an integrating sphere and a photoelectric cell. One of the three prisms (a Wollaston prism) splits the monochromatic beam into two beams. These two beams are made to fall alternately upon the sample and the standard white by means of a Rochon prism rotating at a constant speed of 30 revolutions per second behind the Wollaston prism. The intensities of the two flickering beams are varied by means of another Rochon prism, free to turn about its axis, in front of the Wollaston prism. Light is reflected by the sample or the standard to the whitened walls of the integrating sphere and then to the photoelectric cell, which is shielded from polarization effects by a ground glass plate. A difference between the reflectance of the sample and that of the standard causes a pulsating current in the photoelectric cell, and this is amplified sufficiently to drive a small motor. The motor rotates the Rochon prism located in front of the Wollaston about its axis until the two flickering beams reflected from the sample and the standard reach the cell with equal intensities. The magnitude of this rotation is a measure of the reflectance of the sample and may be read directly, if desired, from a divided circle. However, the rotation of this prism is also translated into a linear motion and is automatically recorded by means of a pen on a sheet of coordinate paper. The wavelength of the monochromatic light entering the photometer is altered at a constant rate and is recorded by a motion of the coordinate paper perpendicular to that of the pen. This color analyzer is a null instrument and the reflectance measurements are independent of the intensity and quality of the light source, the sensitivity of the photoelectric cell, or the gain in the amplifying circuit. In the measurements presented here the standard was always a block of magnesium carbonate freshly smoked with magnesium oxide and tested for its uniformity.

The dyeings made by Draves contained the amounts of yellow (du Pont Tartrazine O) and red (Crocein Scarlet Conc.) shown in Table I. Crocein Scarlet has an absorption maximum at 510 millimicrons. Draves naturally expected that the greatest effect would be produced where the absorption of this dye is a maximum and he therefore confined his spectrophotometric observations to this wavelength. He stated that the presence of "1/5000 per cent of the red could be quite definitely distinguished visually because it made the yellow dyeing slightly redder in hue, whereas 1/10,000 per cent of red was not always distinguishable." In other words, he could always distinguish between samples 1 and 3 but not between 1 and 2. However, he could observe no differences at all between these dyeings from his spectrophotometric examinations at 510 millimicrons.

**Table I**

| | *Per Cent of Dyestuff by Weight of Cloth* | |
|---|---|---|
| Sample No. | du Pont Tartrazine O | du Pont Crocein Scarlet Conc. |
| 1 | 1.0 | zero |
| 2 | 1.0 | 0.0001 |
| 3 | 1.0 | 0.0002 |
| 4 | 1.0 | 0.0050 |
| 5 | 1.0 | 0.0010 |
| 6 | 1.0 | 0.0020 |
| 7 | 1.0 | 0.0050 |
| 8 | 1.0 | 0.0100 |
| 9 | 1.0 | 0.0200 |
| 10 | 1.0 | 0.5000 |

Referring to Fig. 1, the curves of which are spectrophotometric analyses of swatches dyed in the laboratory of Dr. R. E. Rose of the E. I. du Pont de Nemours Co., Inc., and reproduced here with his kind permission, it is seen that the various dyeings (which are numbered in the order given above) are clearly differentiated. These curves are in close agreement with those consistently obtained in this laboratory on dyeings made according to Draves' technique. It should be noted that the difference in reflectance between samples 1 and 2 is approximately 3.5

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[1]Am. Dyestuff Reptr., *20*, 389 (1931).

# Recent Developments in the Chemistry of Silk and of Silk Processing--II

(Continued from page 221, April 23rd issue)

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## Chapter II
## THE SOAKING OF SILK

"SOAKING" is the name generally applied to one of the first treatments applied to raw silk in the process of silk manufacture. It has been defined as a "softening and lubrication of raw silk by means of soaking in oil emulsions, preparatory to the processes of throwing, and the subsequent processes of weaving or knitting."

### Emulsions of Soap and Oil

Until quite recently, the common practice was to soak the silk overnight at 80 to 100° F. in an emulsion of neatsfoot oil and soap, then whizz out the excess liquor, and dry at not over 100° F. Based upon a unit of 100 pounds of silk, the amount of water ranged from 25 to 100 gallons, with the average at about 80 gallons; the proportion of soap ranged from 3 to 8% on the weight of the silk (or 0.25 to 2.25% on the weight of the water); and the proportion of the neatsfoot oil ranged from 6 to 12% on the weight of the silk (or 1.0 to 3.5% on the weight of the water).

An emulsion of maximum stability is obtained when the concentration of soap is 0.25%. The pH of this emulsion is about 9.25. If the soap is dissolved in the total quantity of water and the oil is then stirred in, a more stable emulsion results than when a concentrated emulsion is first made and then diluted with water.

Several investigators have devoted attention to the mechanism of the reaction between the silk and the soap-oil emulsion, and the following conclusions have been reported:—

1. The sericin of the silk reacts to some extent with the alkali of the soap. This is substantiated by the fact that the pH of the soaking bath is always less after the soaking than before, also that the soaking bath contains a higher percentage of free fatty acids after soaking than before.

2. The composition of the fatty matter taken up by the silk from an emulsion containing 2.25% anhydrous olive oil soap and 3% neatsfoot oil with about 2.5% free fatty acid, is roughly one part of free fatty acid and 1.33 parts of soap to 2 parts of neutral fat.

3. Effect of soap concentration—the take-up of fatty matter by the silk increases with the concentration of the soap in the soaking bath.

4. Effect of the oil—the take-up is also greater as the concentration of the oil in the emulsion is increased.

5. Effect of salt in the soaking bath—It has been shown that the presence of salt in the soaking emulsion will not tender the silk nor necessitate an excess of soap in the subsequent degumming bath, if the concentration of this salt is less than 5 ounces per 100 pounds of silk in a bath of 70 gallons. Additions of Glauber's salt to the soaking emulsion up to 10 ounces per 100 pounds of silk, increases the oil efficiency of the bath from 25% up to 73%.

6. Effect of temperature—at 100° F. it requires at least 10 hours for the silk to acquire the maximum take-up from the emulsion. As the temperature of the bath is lowered, it requires more and more time for the silk to attain the maximum take-up.

7. Effect of the stability of the emulsion—less stable emulsions give the silk a greater take-up of fatty matter and more efficient exhaustion of the bath, though with less uniform distribution of the fat throughout the silk.

8. In general, the greater the take-up of fatty matter by the silk, the lower the hydration of the silk.

### Sulfonated Oil Emulsions

Sulfonated oils have often been recommended as substitutes for soap in the soaking of silk. Sulfonated neatsfoot oil is most commonly used for this purpose. The advantages claimed for sulfonated oils are briefly as follows:—

1. Lower pH of the soaking bath. This lessens the detrimental action on the sericin of the silk, and also increases the hydration of the silk.

2. Greater stability of the emulsion. This increases the uniformity of the take-up throughout the entire lot of silk.

3. Shortening the time of soaking. This is particularly true if the sulfonated oil is made slightly alkaline with a mild alkali. An emulsion containing equal parts of sul-

fonated neatsfoot oil and raw neatsfoot oil, and brought from a pH of 5 to a pH of about 7.5 by the addition of triethanolamine, will reach an equilibrium with the silk immersed in it, in about 5 hours at 100° F.

The take-up of fatty matter by the silk may be increased by compounding some mineral oil with the sulfonated oil emulsions. The advantages and disadvantages of mineral oil in the soaking of silk have formed the subject of considerable controversy in the silk industry.

The following figures have been published with regard to the comparative exhaustions of different types of soaking baths by the silk:—

| | |
|---|---|
| Soap and oil emulsions | 40 to 60% |
| Straight sulfonated oils | 15% |
| Sulfonated oils with raw neatsfoot oil | 40 to 60% |
| Sulfonated oils with mineral oil | 40 to 80% |

### Other Emulsifying and Penetrating Agents

Many compounds of this type have been developed in recent years. They may be divided into two classes from the standpoint of silk soaking.

1. Pentrating agents i.e., compounds which do not of themselves support an emulsion but which are suitable to add to soap or sulfonated oil emulsions for the purpose of promoting greater penetration of the silk and hence a more efficient softening action. The alkylated naphthalene-sulfonic acids (such as the Nekals, Alkanols, Neomerpins, etc.), the sulfonated abietenes, and derivatives of glycol (such as diethylene glycol), belong to this class and they offer possibilities which have not yet been fully investigated.

2. Agents which combine penetrating and emulsifying powers, and are suitable to be substituted in place of the soap or sulfonated oil. Representatives of this class are the sodium salts of sulfonated esters of fatty acids or acid amides (such as the Igepons), and the sodium salts of fatty alcohol sulfates (such as the Gardinols and Brilliant Avirols). It has been stated that emulsions of neatsfoot oil prepared with fatty alcohol sulfates at a pH of about 7, show a high exhaust of the fatty matter on the silk combined with a minimum action on the sericin.

### Machine Soaking

Two distinct types of machines have been developed within the last few years to replace the conventional metal lined tubs, in which the silk has formerly been submerged and allowed to stand for lengthy periods of time in the oil emulsions.

1. The impregnation type of machine.—This machine consists of a round tub in which a hollow piston with a perforated bottom is made to slide. After the silk in the tub is saturated with the soaking emulsion, the lowering of the piston causes the excess liquor to be forced out of the silk through the perforated plate into the head of the piston, and the raising of the piston draws the liquor back into the silk again. The process is repeated three or four times to assure thorough impregnation and may be completed in about ½ hour.

2. The circulation type machine.—In these machines the silk is placed in an air-tight kier and the soaking liquor is introduced from a mixing tank into the kier by means of a centrifugal pump. The circulation is effected under a pressure of from 10 to 15 pounds, and the direction of flow is changed at intervals to insure uniform soaking. The soaking is usually completed in from 1½ to 2 hours.

Machine soaking is claimed to have the following advantages over tub soaking:—

1. More uniform take-up of the fatty matter by the silk. The take-up of different skeins in one lot of silk may vary from 2½ to 5% by the tub method, and is claimed to vary less than 0.25% by the machine method.

2. Quicker time. The tub method requires from 5 to 12 hours at about 100° F. to obtain the maximum take-up, while the machines complete the operation in from ½ to 2 hours.

3. More efficient exhaustion. The average exhaustion of the bath by the tub method was not much greater than 50%, whereas an exhaustion of over 90% is claimed for the machines.

There is need of considerable further investigation to substantiate these claims for the machine soaking of silk, and to fully explore the possibilities of this new development.

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### Sandoz Shade Card

The Sandoz Chemical Works has sent out copies of a shade card entitled Developed Dischargeable Colors on Rayon. The card gives methods for dyeing, diazotizing and developing for this class of color. There are illustrated the shades before and after developing to demonstrate the shade of each color when dyed direct. This method of illustrating should facilitate color matching. All of the colors displayed are said to be dischargeable with a 15-20% Hydrosulfite RF Conc. paste.

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### Meeting, S. O. C. M. A.

The luncheon and general meeting of the Synthetic Organic Chemical Manufacturers Association was held at the Chemists' Club, New York City, on Thursday, April 19th, at 12:30 P. M., President Merz presiding.

Dean Clark, permanent Chemical Code Director, requested advice and cooperation from all. Chairman Merz discussed briefly the tariff trading project, H. R. 8687, then in the Senate finance committee. The meeting then proceeded to a discussion of the ambiguous definition incorporated in the proposed Code of Fair Competition for the Natural Organic Products Industry.

The next meeting and luncheon will be held on Thursday, May 17th.

PROCEEDINGS OF THE
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MAY 7, 1934

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**North Carolina State College Student Section**
H. S. Blinens, Chairman; D. B. Hardin, Secretary.

Members should notify the **Secretary** immediately of all address changes

## MARCH MEETING, NEW YORK SECTION

THE meeting of the New York Section convened at eight-forty-five o'clock, at the Elm Golf Club, Paterson, New Jersey, on March 23, 1934. Mr. H. F. Herrmann presiding.

*Chairman Herrmann*: Possibly you have wondered why we sent the notices out so late. One reason was that we didn't think we could trust you with the term of allergy too long.

I understand that the majority of those here tonight are those who came to find out what allergy is, having tried to look it up in the dictionary and not being able to find it (Laughter). I seem to have hit the mark.

Well, I am a jump ahead of you, because I brought the Doctor out and I know all about it. I think we have a very interesting discussion coming to us, and it gives me great pleasure to introduce Dr. Arthur Stull and also to invite your attention to a subject which I think this Section is pioneering—that is, we are pioneering a discussion of this particular matter.

Directly or indirectly, I think quite a few of us have been confronted with this problem, and if you have shared the experience of the average, you have not found a workable answer or solution to your problem in the ordinary references that are available to us, and it is, therefore, with the double thought not only of having this interesting discussion here before us, but of writing into our records something that may serve as a future reference for the rest of our Association, that this program was planned.

Dr. Arthur Stull! (Applause.)

*Dr. Arthur Stull*: In talking to Mr. Herrmann on the way out tonight, I realized that perhaps a good many of the workers in the textile industry know more about allergic reactions to some of these dyes and compounds that you are using than we do ourselves. There has been very little reported in medical literature about it and, as a matter of fact, we are just starting to find out a little something about it. I think we will have to rely on some of you manufacturers and textile workers to give us some information on this field.

I hope after I have read these few pages that there may be some discussion, as I would like to know what sort of reactions you come across in the plants and in the industry. If there is any point while I am discussing this that you would like to bring up, I hope you will stop me.

. . . Dr. Stull then presented his prepared paper, "Allergic Reactions to Materials Used in Textiles" . . .

Proceedings of the American Association of Textile Chemists and Colorists

# Allergic Reactions

## To Materials* Used in Textiles

*By* **ARTHUR STULL, Ph.D.**
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ALLERGY is the term adopted to signify any altered degree of reactivity in the animal body, whether depending upon antigen-antibody reactions or upon the effect of entirely non-antigenic substances such as sensitivity to light and drugs. Hayfever, asthma, vasomotor rhinitis, eczema, dermatitis, migraine, serum disease, urticaria, angioneurotic edema, and poison ivy are allergic conditions. A single one of these pathological conditions may result from different substances or a single substance may give rise to several different pathological manifestations, for example, ragweed pollen may cause asthma, hayfever, or both, and in addition urticaria. These allergic conditions are caused by direct contact, inhalation, ingestion, etc.

I am going to describe the immunological process, and I hope the terms will be familiar to you. Unfortunately, this field has a terminology all its own, and I have confined myself to the general immunological terms. Immunological reactions are the processes by which the living organism defends itself against the chemical attacks of its enemies. Anaphylaxis is one of the most spectacular phenomena in immunity. Diphtheria antitoxin (horse serum) containing various proteins can be injected in a person without a serious reaction providing the patient had not received any previous injection of horse serum or is not naturally sensitive. Following the injection of a foreign protein of this sort, a person may become sensitized so that subsequent injections of very small amounts may give rise to severe or fatal reaction. This type of reaction takes different forms. The patients may have an asthmatic reaction, and become cyanotic. They may break out in hives, or in a rash which may cover their entire bodies, and death may result with the closing of the bronchial tubes. Most individuals become sensitized to a foreign protein after its injection for a limited period, but an allergic person remains sensitized indefinitely. All foreign protein, providing it is sufficiently soluble, will give rise to antibody production upon injection into an animal. The nonsensitive state, the anaphylactic state, and the immune state depend upon the character, quantity, and distribution of the antibodies. The anaphylactic or sensitive state exists when antibodies are attached to the body cells.

We really don't understand what the exact difference is in these conditions. We can artificially sensitize an animal by giving an injection of protein under certain conditions. When we want to produce immuntiy in animals we give them the same injection of a certain protein in order to get a highly antibody formation but give the injections three or four days apart. If you give a protein injection, and follow it eight or ten days later with another injection of the same protein, the chances are that you will kill the animal in an anaphylactic shock. If you give it at a shorter interval, you avoid sensitization and can usually get away with it. On the other hand, once in a while you will have an animal—perhaps only one out of the group—that, on the third or fourth injection will die of an anaphylactic shock. We don't know why, but the fact is that that animal has become sensitized and not immunized. In the artificially immunized animal, for example, after serum injection, antibody response is indicated by a positive precipitin test between the antigen and the serum. The precipitin test is carried out by taking the serum from the animal, and in various dilutions, treating it with various dilutions of the antigen —that is the protein which we have injected. After letting the mixtures stand in the icebox overnight, if there was an antibody response, a precipitate will form in the test tube. It is a specific reaction for different proteins. It is the most accurate means we have of differentiating between different proteins. In most of the allergic or naturally sensitive individuals it has been impossible to demonstrate precipitins in their sera. For example, it has been impossible to demonstrate a precipitin reaction between the sera of a ragweed sensitive person and the pollen extract. In an allergic person an intracutaneous injection of a very minute amount of the specific offend-

*Presented at meeting, N Y. Section, March 23, 1934.

ing material to which the person is sensitive, will give rise to a very characteristic immediate skin reaction with wheal formation, itching and erythema at the site of the injection, and larger amounts may give rise to a serious or fatal anaphylactic type of reaction. The sera from many of these allergic cases does contain a kind of antibody not demonstrable by the precipitin test but sufficient to sensitize a skin site in a normal individual. A skin site so sensitized then gives a positive reaction to the antigen and can be specifically and quantitatively desensitized by injection of the specific antigen.

Many substances to which individuals are sensitive are protein, and the reaction can be explained as a mild anaphylaxis where contact with the foreign protein antigen has given rise to antibodies which sensitize the body cells. It is not so easy to explain the numerous examples of sensitivity to drugs, metallic salts, dyes of nonprotein nature. As a possible mechanism of this kind of sensitization, it has been suggested that these nonprotein substances may unite with the body proteins, and therefore become like foreign proteins which give rise to antibody formation and sensitization. Only proteins give rise to antibodies, but the recent work in immunology has shown that after sensitization to a compound protein specificity may reside largely in the nonprotein component, and the nonprotein component may give rise to anaphylactic response in the sensitized animal.

This has been suggested as a mechanism, and I think there is some chemical basis back of it because you do find that the chemical substances, the typical non-protein substances to which people are found sensitive, are in general reactive types of compounds, such as phenols and drugs, and the metals are the typical metals which do combine with proteins. Family histories have shown that a hereditary factor determines the capacity of persons to become sensitized, and therefore we see two general groups of people, the Allergic and the Nonallergic. Sensitization among industrial workers shows that for certain substances when contact is frequent or intensive a considerable percentage become sensitive. Anatomists are frequently sensitive to formaldehyde, artisans to turpentine, patients to adhesive tape, doctors to novocaine and mercury salts, probably as a result of excessive contact.

In order to make a diagnosis of these allergic conditions, we first take a careful history of the case, noting particularly heredity, occupation, home environment and contacts, and attempt to discover if the allergic response follows any definite contact. We then test by intradermal test to determine any positive skin reactions with the common inhalants such as animal danders, dusts, and pollens and the common foods. Any suspected substance or material we test by patch test or intradermal test of its extract.

In this work close cooperation with the manufacturers is essential as frequently our only clue is from the history of a reaction following the use of some manufactured article. For example, in the case of an eczema following the use of adhesive, the manufacturer furnished us with all the raw material used in its manufacture, and by patch test we found that the individual was sensitive only to the resin. Unfortunately we do not always get such good cooperation, and manufacturers refuse information, possibly fearing we will condemn their product. An example of this was a product containing mercury where the manufacturer refused to give us any information, and only after considerable loss of time and trouble did we discover its presence, and by warning the patient to avoid all contact with mercury relieve him from a most troublesome condition. The allergic reactions are due usually to no fault of the article or material but rather to an unfortunate predisposition of the individual. We are not interested in condemning products or exposing trade secrets, and hope you will give us your full cooperation in such circumstances.

Allergic reactions may result from sensitization to the raw materials used in textiles. They may result from chemicals used in processing the raw materials and to certain dyes. There are case reports of allergic reactions to materials following dry cleaning processes.

Sensitizations to animal danders are fairly common. The sensitizing material is the dander and not the hair itself. This is the case in the fairly common sensitization to cat, horse, dog, rabbit and feathers. Properly cleaned horse hair mattresses and pillows do not cause asthma in horse dander sensitive individuals. I might add that sensitivity to animal danders is more common than you would suspect, and for some reason or other, when people are sensitive to animal danders, they are extremely sensitive. We see cases that will be thrown into a hay-fever or asthmatic attack, if a cat merely walks through the room. It is hard to believe that sensitization could be so extreme. Some years ago we found a number of clinic patients sensitive to goat dander. They were southern Europeans who had brought with them goat hair mattresses made from crude, improperly cleaned hair. There are reported cases of sensitivity to mohair, but it seems improbable that the dander could be carried through into the finished material, and in such cases it seems more probable that there may be a factor in the stuffing or processing materials.

Sensitivity to cotton seed is not uncommon. We have no cases of sensitivity to washed cotton goods, but do see cases sensitive to cotton stuffing and raw cotton goods. The bits of cotton seed in cotton stuffing are sufficient to provoke asthmatic attacks in sensitive people. This is due to the bits of cottonseed that stick to the cotton. We have one patient at the clinic who is extremely sensitive to cottonseed, and she has to wash every bit of cotton goods she buys before she uses it. In such people the injection

of 0.1 cc. of 0.001 mg. protein nitrogen per cc. cotton seed extract will give a marked local reaction, sometimes lasting for several days, and may produce an asthmatic attack. Kapok pillows and mattresses are suggested for such people but some people are also sensitive to kapok seed, in which cases it cannot be used.

There are two types of sensitivity to wool. A woolen salesman and a dress designer reported a scaly eruption on the hands and forearms which occurred periodically. Ointments aggravated the condition. Patch test with the different ingredients of the ointment showed that lanolin used in the ointment, as well as the lanolin in the wool, was the cause of the eczema, and it disappeared after removal of all contact. There are isolated cases of asthma from contact with woolen blankets. There is a physical factor involved in contact of woolen clothing with the skin, and the severe itching following its use may be a sort of physical allergy. We have one case in the clinic of a person who is sensitive to a great many things, and contact with blankets will cause her to break out in hives. As soon as the blanket is removed, the hives disappear. Whether that is true sensitization or physical allergy or both, we are not sure.

There are two common types of reactions coming from silk, asthma and eczema, and in the cases we have seen both these reactions are present. Extracts of raw silk give immediate typical skin reactions in these asthmatic cases, but we have not been able to reproduce the eczematous eruption by patch test with raw silk or with the particular silk material causing the trouble. It may be that the quantity used in a patch test is not sufficient. Sensitization to the water soluble sericin of silk seems quite likely, as pongee and raw silk material are usually the most troublesome in these asthmatic cases. The eczema may come from something used in processing the silk, and perhaps the antimildew is partially responsible. On the other hand, metallic salts might be responsible. When we find people sensitive to metals, they are usually extremely sensitive. You will notice that physicists working with copper and nickel salts sometimes become very sensitive, and on patch tests in very high dilutions, they will give positive reactions. Allergic people are not infrequently sensitive to phenol and phenol compounds, and I believe it would be of interest to patch test some of these troublesome eczematous cases with these products, as I believe in the industry these creosols and metallic salts not infrequently cause eczema among the workers. Taub in a study of allergy due to silk protein extract, found that out of 105 cases with suggestive positive skin reaction to silk, 27 cases were definitely proved to have a clinical sensitivity to silk, with the majority of the clinical manifestations, eczema, and a few cases of asthma and urticaria.

In regard to artificial silk sensitization, I have been unable to find any definite information other than very vague indications. It seems quite probable that some of the chemicals used may be responsible for occasional allergic responses.

The question of dye sensitivity is most complicated and little understood. A case reported by Rackemann is interesting. The man had a severe dermatitis. Patch test with pieces of the blue serge suit he was wearing produced the condition, as well as numerous other articles of dyed clothing, so the blame in this case could not be laid to faulty dyeing of the blue serge suit. Undyed pure cotton, wool, silk and rayon gave negative patch tests. Material dyed with six commercial dyes was then tested, and three gave positive reactions. Then 26 commercial dyes were tested by patch test, and 11 gave definitely positive reactions. All the azo dyes were positive as well as three triphenyl methane dyes. Diazoamino benzine gave a positive reaction.

The importance of Allergy in Medicine is becoming more recognized. New causes of these various allergic conditions are being found continually, and I believe progress in this field depends largely upon the degree of cooperation between the chemists, the manufacturers and the clinicians.

### Discussion

*Dr. Stull*: Are there any questions in this field? I would like to hear if any of you have any interesting cases that you have seen in the plants or in the industry. (Applause.)

*Chairman Herrmann*: There is one symptom exhibited by many allergic individuals, which the Doctor hasn't touched on, and that is the speed with which they run to their lawyers. (Laughter.) I was wondering whether the Doctor had any solution to that problem. Seriously speaking, some of these people, I am sure, deserve our heartfelt sympathy. In listening to the Doctor here, we must realize how unfortunate some individuals are, but they seem to complicate our industrial structure a good deal, and that is one of the reasons why we are devoting this evening to a discussion to see to what extent the industry can protect itself by calling upon the law of averages. If the average person does not react unfavorably to dyed clothing or to ordinary, processed wool, cotton and silk, just what can be done about the rare individual (I hope he is a rare individual) who is so affected?

Dr. Stull was hoping that during our discussion we might bring out some rather interesting contacts with allergic cases, and I would like to invite the fullest sort of discussion. I was telling Dr. Stull on the way down of a case that I had personally encountered of a woman who

dyed a dress at home with a package of ordinary black dye, such as one can purchase in any drug store. The dress had been worn by her previously, with entire satisfaction. But after she dyed it, she claimed to have experienced great irritation on the first wearing, and then, when she wore it the second time, the story goes that her arms swelled so badly that the waist had to be cut off in strips.

I thought that the story was exaggerated, but Doctor Stull seems to have encountered parallel cases.

*Mr. Leibiger*: I feel that I probably have something to tell Dr. Stull, or to show the connection between chemistry and medicine.

First I want to tell you that I went through the University for Bacteriology, and the item of the agars and the foods for the germs interested me so much, that I took up chemistry with it. Ever since I left the University it has been a kind of hobby with me—I think you call it that—to study the possibility of growing germs on textiles. I have had to do that in order to study the disease of the silkworms, as we have many troubles in our factories with germs which destroy the fibers.

It would take too long to tell about the research work I have done on it. I would just like to say that I think the facts Dr. Stull told us about are due to the saccharification of the textile fiber, of the fibroin; that artificial silks do not show you the results you see, for instance, on the natural silk. I understand that quite well, because our artificial silks are much less soluble, much less changeable into sugar, or lower carbohydrate than the natural silk.

You would not have those results, for instance, on mercerized cotton. I do not think you would, because it is sterile, it is sterilized, and the surface of it is too shiny, too flat to give any possibility to the germ to grow on it. You would not find it on acetate silk, because there is only one small part of the fiber which the germ would be allowed to grow on, and that is the blow holes which fill with dirt and sugars and so on, which give the germs a possibility to grow. The acetate fiber does not afford such an opportunity, because the acetate fiber is too far away from the carbohydrates, from the soluble carbohydrates.

What you found, for instance, that the use of metal salts allowed germs to grow on fiber is probably due to the forming of acids of saccharification of the fiber again. Even so, in the use of all kinds of dyestuffs, which come very near to the sugars, carbohydrates, they are at least made up with carbohydrates, with starch, dextrine and so on, which are food for the germ argol.

So I really think you should not look for the products we use. You should look for the saccharification of the fiber. Also, when you look at the different fibers, you should look especially at the solubility of the fiber. Natural silk fibroin, we know that it is sugar, polymerized sugar. It is an agar for the germs, of course.

So I think there would be a connection between medicine and textile chemistry. I do not know whether you understand me perfectly, because I do not speak very good English.

*Dr. Stull*: With eczema and all these allergic reactions, it is true that we may have sensitization to bacterial organisms and their products. A person may become sensitized to the bacterial products and to the toxins formed, and a complicated field in asthma is the sensitization to particularly the upper respiratory infections.

Now in the case of sensitization to metallic salts, and to some of these pure proteins, where there is no connection with any micro-organism, it is a sensitization to the pure protein, or the material itself.

I think the difference between the artificial silk and the pure raw silk, the natural silk, is that natural silk is a typical protein product, with perhaps germs growing on it. I can conceive of the sensitization to the organisms, but why can't you have sensitization to the silk itself? Of course, hay-fever may have nothing to do with bacteria. The pollen extracts which we use in this work are absolutely sterile, and they will produce the hay-fever response.

There are a good many substances that are absolutely free from all bacterial products which cause asthma, or hay-fever, or eczema. Egg protein is a very common form of sensitization. Particularly in young children we find sensitization to eggs quite frequently. I remember one case that was so sensitive to eggs that whenever she came in contact with anything even cooked with eggs, the child's lips would swell and her mouth would become edematous.

*Mr. Zisman*: Has any work been done by the Doctor to determine why different people or certain people are sensitive to these particular materials. What is there about it, or is that a field unknown?

*Dr. Stull*: I think that is a field unknown. We don't know why. Of course, when a person has had an injection of horse serum, you can trace it to that. You do find that bakers, for instance, are sensitive, sometimes, to flour, probably from inhalation. We had a man come into the clinic not long ago who worked with hops. He had asthma and a rash. It came from contact with hops. In these cases you can see where it came from. I think that sensitization can be explained as analogous to the typical animal reaction you get from the injection of foreign proteins. On the other hand, why it is that part of the population has hay-fever when all of us come in contact with ragweed pollen, we have no idea. There does seem to be an hereditary factor, which determines the capacity to become sensitized.

*Mr. Baxter*: Doctor, how common is the fact of a person being sensitive to bichromate of soda? It is very

interesting, inside of a dye plant, to note that perhaps twenty men can wash their hands in bichromate of soda without any effects, and the twenty-first will develop a rash almost as soon as he touches it.

*Dr. Stull*: I am much interested in that, and I think that is one thing we want to try, for instance, in our silk sensitive cases. Nickel sensitization is not uncommon, and there is no reason why chromium sensitization shouldn't be just as common. As far as I know, there has not been much said about it.

*Mr. Baxter*: That was brought out in some of my experiences. In working on a certain type of machine, such as a Logwood black dyeing machine, you would have to take certain men entirely away from that room in order to keep them from breaking out or from having these sores develop on their hands principally.

*Dr. Stull*: We will certainly try some chromes. The interesting thing is that when you find a person sensitive to nickel, it doesn't make any difference which salt it is. You can put a nickel coin on their skin in patch test, and they will get the reaction as well as if you put on a soluble salt. So usually, if the metal is present, it doesn't make any difference what chemical combination it is in.

*Mr. Baxter*: The reaction of this particular case differs somewhat from the way you have mentioned it, in that certain people could handle that over a period of years without showing any effect whatsoever. Another man going in there for the first day will immediately develop these sores.

*Dr. Stull*: We are not sure whether a person inherits a sort of specific natural sensitivity, which gives a reaction on first contact in some cases or not. But it is a little difficult to be sure whether they have had a previous contact, for instance, with chromium salt.

*Mr. Freedman*: In answer to Dr. Leibiger's suggestion that the cause of some of these allergic symptoms was due to the bacteria present in various textile fibers, I am of the opinion that that might very well be discounted in so far as the general public is concerned because of the fact that in the manufacture of textiles, the materials are put through various processes, including, in the case of cotton goods, scouring and bleaching, and in the cases of your silks, you have your boiling and so on, and in the dyeing processes, you have the antiseptic values of a good many of the dyestuffs. So the germs—those that were originally present in the goods—would undoubtedly be killed off.

The Doctor spoke before of something that I wasn't quite sure of. I didn't know whether he meant scarification or saccharification.

*Mr. Leibiger*: Saccharification.

*Mr. Freedman*: If it were the scarification rather than the saccharification, I could see where greater solubility of the proteins might result, after the destruction of the outer layer of textile fibers.

*Dr. Stull*: Yes, I think that is true.

*Mr. Freedman*: There is a chemical test in which Paul's reagent is used to determine chemically whether or not the surface of the fiber has been injured. I don't just recall the formula, but I have it in my office, and if you would care to have it, I would be glad to send it to you. The test is rather simple.

In so far as the saccharification is concerned, if that is so, then there are undoubtedly any number of sugars to which the person would also react. I believe there was a report issued not so long ago about certain forms of dextrine which were found to be harmful and which I believe caused severe illness and death in some individuals.

The effect of the various metals on different individuals is exceedingly interesting, especially so since a number of chemists contend that no metals are absorbed to any great extent through the skin. Of course, we know that calomel ointment, lead plaster, Burow's solution, some of the zinc salts of solutions, are used for their antiseptic or other medicinal values, and it would seem that this contention that metallic salts are not absorbed through the skin is founded more upon belief and faith than upon actual fact.

However, I think it would be well worth while to note in all cases where metallic poisoning or let me say reactions to metals are reported, whether or not there has been any break in the skin, because there, of course, we could naturally see a more ready absorption of the metal through the skin. There have been cases where people have purchased mordanted bathing suits, and they appear to be sensitive. There are cases where people who have purchased bleached white cotton sheeting, with no mordants or dyestuffs, have reported irritation and in some cases, rashes resulting from contact.

As far as cotton is concerned, or cottonseed I should say, there are various grades of cotton linters, and the cheapest grade, the number 6 or 7, contains quite a bit of the cottonseed. The amount of dust in these linters would amount to possibly 60 or 70 per cent, and I can readily see where anyone who is susceptible to cottonseed would be very likely to become a fit patient as a result of contact with cotton linters.

The subject of chrome is very interesting. The chromium salts, I believe, have been reported in numerous instances as being the cause of sensitivity, and one might think of the chromium-plated articles that are on the market and wonder whether or not that is not another avenue for contamination. The chromium is quite insoluble, and yet chromium, nickel, and certain other metals are frequently attacked by certain fruit and vegetable juices and

some solubility takes place and here and there a case of allergy may be reported as a result of it.

*Mr. Leibiger*: I think the fact on which we disagree is exactly the same fact on which two different opinions of life disagree, the vitalism and the Darwinism. (Laughter.)

*Dr. Stull*: I can readily see that, if you have organisms growing on a piece of silk, or on a textile, causing decomposition products of the protein in that material, they might cause sensitization. But my point is that we do know that these sensitizations concern materials irrespective of any bacterial organism. We have to explain those.

*Mr. Kennedy*: Dr. Stull mentioned the reaction to dyestuffs. Did you take into consideration the dyestuffs themselves as intermediates or the standardization agents, such as salt and dextrine? Did you keep that separate from the dyestuffs?

*Dr. Stull*: We don't know which it is. In the cases of sensitivity a person might be sensitive to the dye alone, to fabric alone, and to the dyed fabric. We have never seen any sensitization to common salt, and I think it is unlikely that we would. As a matter of fact, I don't believe we see sensitivity to pure carbohydrates. There are cases of cornstarch sensitization, but such products usually contain traces of nitrogen and probably traces of protein. Of course, that is where the chemists are in difficulties, because we have a good many solutions that are so dilute that we can't determine nitrogen in them at all, chemically, and they will give strong, positive reactions in sensitive people. The amount of material that will bring forth a reaction is so very small, that it is very difficult to really determine what it is. There are a great many inaccuracies in the literature. The carbohydrate materials precipitated from pollen extract may contain 40 or 50 per cent reducing sugar and on test will give a skin reaction. It has been suggested that it is not protein, but that it is carbohydrate which has caused the sensitization. If you analyze the material, you will find 5, or 6 or 7 per cent nitrogen in it, indicating the probable presence of protein of sufficient amount to give a reaction.

*Chairman Herrmann*: Mr. Wood, you had a question.

*Mr. P. J. Wood*: I am a little sensitive myself when it comes to the question of hay-fever and its causes. (Laughter.) But I have been wondering since I heard your last remarks as to the immediate cause of hay-fever from ragweed pollen, whether it might not be that if we could produce a pure, unadulterated pollen, that that pollen would probably be entirely inactive. (Laughter.)

We are taught to believe in the reaction of such very minute quantities of matter today, that it seems to me there might be something that hasn't yet been discovered. Couldn't it be possible that it is only the infected pollen—in other words, getting to Dr. Leibiger's idea of the bacterial action, that it might be infected pollen only which causes hay-fever? To what extent ragweed pollen is infected, I don't know, and I should think that it would indicate that a certain amount of research is necessary in that direction.

Of course, the whole thing comes back to that old proverb that what is one man's meat is another man's poison, because we all react differently to different foods, or we think we do—and sometimes we only think we do.

There was an interesting article published—it might interest you to look this up—in the Journal of the Society of Dyers and Colorists, I don't know whether it was last year or the year before, on what they describe as "printer's" dermatitis. That was something which was entirely unknown to me until last year when we had a case in the mill. It seems that a man who had been working on regular print work with acid and basic colors, and direct colors with dextrine, gum and tragacanth thickenings, had previously experienced no difficulty at all.

However, he was called upon to print with vat dyestuffs, and he broke out in a rash. His hands were painfully cracked and swollen, and he decided to give up printing. He was an apprentice of a few years standing. The condition became so serious that he went to a doctor, who, of course, treated the matter locally entirely, and told him the only thing he could do was to give up printing. In other words, the printing was blamed for his condition.

I don't think that it was the difference between the direct acid and basic dyestuffs and the vat dyestuffs that caused the condition, and I don't think it was because they were colors containing a reducing agent. The thickening was probably only another form of dextrine, probably some starch. It was probably not that. My own private theory—and I am not a medical man—is that the potash probably dried or extracted the fat from his skin and caused it to break out in little cracks such as people who do a lot of work with strong soaps and alkalis will have on their hands, and that then the infection attacked the flesh through the breaks in the skin. What dermatitis is, I don't know.

If it is a germ infection, it seems to me more than likely that the infection entered in that way. But he was the only printer out of seven or eight who was affected in that way. All the other men could work with the colors. I got him to work with gloves for a short time. That is not very handy for a printer as many of you know, and that didn't seem to help him. It seemed that the slightest contact with the color caused infection. I suppose a man, even working with gloves, once in a while will have an itch somewhere and touch his face.

It didn't affect his face so much as his hands, and I took it that wiping these fairly alkaline potash thickenings from the doctor and from the color box probably extracted the grease. I don't know whether that is a tenable theory,

or it might be that the potash itself had some effect, although you say that sodium salts, particularly chloride anyway, have no effect. But probably potash might have an effect where soda would not.

I don't know very much about chrome poisoning, because I have seen only two cases of it, and those were men in the mill where I served my apprenticeship. They positively could not work on a machine for mordanting wool in those days, because if they worked on the machine and were ever so careful not to touch the liquor, it seemed almost as if there were something in the steam—and we know there was not—that affected them so that they would break out after a half day's work on the chrome machine.

Other men could do it with impunity, as Mr. Baxter said. They could even bathe their arms in it and not have it affect them. It never affected me in the slightest degree, but I am inclined to think that these men were somewhat eczemic and that they had minute cracks in their skin, and that this condition was probably exaggerated by the action of the chrome on the skin because we know that chrome is used for tanning leather, and it might have some similar action on the skin which would cause it to crack, and the infection would enter in that way.

I feel more inclined to believe that it is the condition of the skin that is affected by the metals, which puts it in shape to receive bacteria of any sort, which causes some kind of disease.

*Dr. Stull*: In that connection, it is not always easy to distinguish between a typical allergic response—particularly in an eczema—from an infection? We do try in some of these cases that come in to find out whether it is a true allergic response or whether it is some kind of an infection by mould or fungus which has resulted in a combination of allergy and infection.

*Mr. Bell*: I have just been wondering, during all this conversation, about the differentiation between corrosive action. You came pretty close to it in talking about caustic potash. There are certain materials that are definitely corrosive, such as the acids that are used; sometimes strong alkalis. Sometimes they are the fumes of potash and sulfide coming up from the vat, we will say. Do you have trouble differentiating those effects from your allergic reactions?

I just wondered, for instance, if there is anything specific about those reactions. Are certain people more susceptible to corrosive action—we will say acetic acid, hydrochloric acid, sulfuric acid, soda ash and so on? Are certain people more susceptible to actions of these materials to skin eruptions, to infections of the eye, for example, of which I have had several cases? Are certain people more susceptible to those things than others, or are they pretty general with all?

*Dr. Stull*: The corrosive action of a substance, if applied in sufficient quantity, ought to react the same on every person. In allergy, we try to distinguish between corrosive and allergic reactions.

On the other hand, it is true, I think, that there is a variation. A person with a very dry skin probably would be more affected by some corrosive substance than a person with an oily skin. I think there is a variation, so that you have to be careful to distinguish between a typical allergic response and a corrosive or a poisoning action of that sort. Sometimes I don't think it is easy to distinguish, but in general, I think it is.

*Mr. P. J. Wood*: In that connection, wouldn't the question of hypersensitivity come into play, because there are people who can stand a good deal more pain than other people—I mean their nerves are not nearly as acute.

We have a case of a master mechanic who has had some of the most terrible burns, and he went about his work as though nothing had happened to him. I don't know whether he is just particularly brave or whether he isn't quite as sensitive as other people. You find the same thing with people in their approach to the dentist, I think. Some seem to dread it almost to the point of collapse; others go about it as if they didn't care. Perhaps they don't care, or perhaps they had a shot of good rum.

It seems to me there are so many variables in the human organism that your immediate task is particularly difficult. There are so many variables of which we take no account, and as I said in my previous remarks, we are beginning to take note of the influence of very, very small amounts of matter which previously we had never dreamed could have effect.

One typical example, which I think Dr. Harold will remember, is the exceedingly small amount of copper salts and I think manganese salts in raw cotton, which interferes with the successful rubber vulcanizing, which seemed to be a problem that was unsolvable, and produced variations in successful vulcanization, and it was then found that the fifth decimal point—

*Dr. Joseph F. Harold*: .003.

*Mr. Wood*: That .003 is the tolerance.

That might be true in the human system. I remember reading some years ago about a man who was sneezing so violently and they looked all around to see where the draft was. He said he was very sensitive to drafts. Finally, I think they found the stopper out of the vinegar bottle. (Laughter.)

From personal observation, I would say that during the hay-fever season, the slightest draft will cause a most intense fit of sneezing, much more so in the summer time, which also leads me back to that theory of hypersensitivity of the nerves, because why should the nerves be so particularly tender and sensitive to drafts at that time?

Do you think it is possible that if you were to make

extensive researches into the pH value of the blood of your sensitive patients, you might learn something, because a very slight degree of acidity or hyperacidity or hyperalkalinity in the blood might have a tremendous role to play in producing these allergic phenomena?

*Dr. Stull*: We do find that the allergic type of person is usually fairly high-strung, and we do find in skin testing patients with a known clinical history—that of two patients, one will give a very marked wheal on test with the extract, which will look as if it caused severe itching, and he will say he has no itching at all. On the other hand, you will give another individual the same material with the same clinical sensitivity, and he will have very severe itching.

There have not been found any consistent variations in the blood chemistry peculiar to the allergic individual.

*Chairman Herrmann*: We don't want to weary the Doctor, but if there are any pertinent questions, we would like to have them. I am rather disappointed about one thing—that nobody has brought in the word "idiosyncrasy." (Laughter.) I don't know how one could have a discussion on allergic reactions without using that word at least once.

*Dr. Harold*: I would like to ask Dr. Stull if these tests have been supported in any way by the isolation of pure proteins and the testing of those, for instance, with any of these constituents of the wool fiber. Have tests been made?

Then I would also like to ask him if there is sufficient interval in the development of these reactions to proteins to allow for protolysis? Is it a primary or secondary reaction to the protein? I would like to ask further if in the case of woolen blankets or silk or wool in general, an insolubilizing of the wool by treatment with formaldehyde has aided in desensitizing the patient.

*Dr. Stull*: At the Roosevelt Hospital, we have been working on isolating the protein out of the pollen extract, and we have been successful in isolating a water soluble protein which analyzes 14 per cent nitrogen, carbon around 50 per cent and hydrogen about 6 or 7 per cent. It gives all the typical reactions for protein, the typical color reactions, and the material has all the activity of the whole pollen extract. It is only a small part of the pollen extract.

It does give just as good clinical reactions, and produces constitutional reactions similar to the whole pollen extract.

Just how far that reactivity goes, with protein spilt products, we don't know. Recent work reported has shown that enzymatic digestion, if carried sufficiently far, will completely inactivate pollen extracts. On the other hand, they will give a reaction after considerable enzymatic digestion. But when you realize what small amounts of protein give a reaction, it is a little difficult to judge whether the broken down products of protein will elicit reactions.

As far as we know, we believe that the peptones and the amino-acids are not factors. Different pure amino-acids have been tested, but failed to give positive skin tests. However, we may some day find sensitizations to such material.

*Dr. Harold*: Secondary products are not dangerous?

*Dr. Stull*: Just where that division comes in, I don't know. I think most of the proteins in pollens are probably rather small molecules, as proteins go, and very readily water soluble.

*Dr. Harold*: As a sort of corollary to Mr. Wood's pregnant question about the pH of the blood, there are two types of sweat on the average individual, a primary exudation which is acid, and the sweat of the careless person which is ammoniacal. Are these cases of dermatitis associated with unclean people, or has anybody studied the relation of the character of the sweat to the character of the sensitization?

*Dr. Stull*: I don't think they have really determined that factor. So far as it has been followed out, they haven't been able to determine any variation of the allergic person from the normal, and the only thing we can see is by passive transfer, that there is something in their blood that the normal person doesn't have. There are some sensitive people whose sera will not transfer to the normal person. Why that is, we don't know.

*Mr. Freedman*: Mr. Chairman, I might add that Mr. Appel of the National Bureau of Standards reports that silk when finished on the alkaline side does not deteriorate as rapidly as silk which is finished on the acid side. That holds true particularly for weighted silk. I believe his remarks are confined to weighted silk.

*Mr. Wood*: Mr. Freedman referred a little while ago to the theory held by some people that nothing enters the whole skin, that is, in the way of metallic salts. It is possible that the skin could act as a dialyzer and that you could have, by osmosis, a certain transference of a crystalloid into the blood stream which would cause trouble?

*Mr. Freedman*: I believe we can look upon the confirmation of the fact that metals may be absorbed through the skin, if we read the literature concerning the many cases of thallium poisoning, resulting from the use of depilatories.

*Mr. Wood*: Isn't it likely that some portion of that may be introduced by ingestion?

*Chairman Herrmann*: Dr. Stull mentioned to me on the way out that he thought that in the case of a dermatitis resulting from the wearing of a garment, possibly a preliminary irritation of the skin, due to friction, a certain erosion of the skin, might have a bearing. I wonder whether you might like to develop that for just a moment. I am rather interested also in your point of view of the

effect on the normal human body of ordinary dyed materials, and whether or not a fabric lying more or less idly in loose contact with the body would have less effect than one pressing tightly against the skin with the possibility of causing chafing or coming in contact with skin imperfections such as wounds or boils.

*Dr. Stull*: I think that may be true, because, of course, we know that boils are most prevalent around the neck. They are usually caused by something rubbing on the surface of the skin, and the surface bacteria, the Staphylococcus, rub into the skin pores and start an infection. That happens very often. When you have a dermatitis, you do often see it around the neck, where the band of the dress or material is rubbing on the neck.

*Mr. Freedman*: Mr. Chairman, I would like to ask Dr. Stull whether or not a combination of patch test and scratch test would disclose the true cause or tend toward disclosing the true cause of infection, if I may use that term for it.

*Dr. Stull*: We test intradermally with an extract. We prefer to do it with an extract—a salt solution extract. But if the material is insoluble, we will test by scratch test. Of course, people who have asthma from silk will usually give the skin reaction. We get the raw silk, and we make our extracts and we test with the extract, and if necessary, we test by scratch test.

On the other hand, we haven't been very successful in many cases in connecting up the eczema with either a patch or scratch test or even an intradermal test. However, we may not have been using the correct material in sufficient amount.

*Mr. Schmidler*: Certain chemicals which are used in silk finishing, such as antimony, barium, lead, are poisonous or harmful to normal people. Do you find any correlation between the allergic reactions of substances which are harmful to normal people and the allergic reactions of such substances? That is, are such substances more apt to show allergic reactions than other substances which are not harmful to normal people?

*Dr. Stull*: I don't think we do see that connection. Of course, we see the allergic people, so I don't know whether my answer would be a just one. I don't know whether those substances which are poisonous to normal people are more often factors in allergy. Of course, it is true that the metals, mercury and arsenic, are factors in allergy quite frequently, but whether it is due to their poisonous property, I don't know. They are poisonous because they probably precipitate the body proteins, and perhaps that is the reason that they are a factor in producing an allergic condition.

*Chairman Herrmann*: To carry that question just a point further, could one say then that according to your observations pure silk or pure dye silk is apt to cause allergic reactions in hypersensitive people, just as frequently, say, as tin weighted or lead weighted silk?

*Dr. Stull*: I am afraid that is where we are in ignorance.

*Chairman Herrmann*: Is it the silk that is causing the trouble, or is it the weighting on the silk, and is it the weighting which in itself is usually considered to be of, say, a poisonous character? Tin isn't any too wholesome for the body; neither is lead.

*Dr. Stull*: I can say that we have found that pongees are the most troublesome in producing asthmatic conditions, indicating the sericin as the factor. The dye or weighting in the finished product may also be factors particularly in eczyema.

*Chairman Herrmann*: Pongee is a more or less pure fabric.

*Chairman Herrmann*: Well, gentlemen, I don't know whether you realize it is twenty minutes to eleven. I suggest a rising vote of thanks to Doctor Stull.

. . . A rising vote of thanks was extended to Dr. Stull, and the meeting thereupon adjourned at ten-forty-five o'clock P. M. . . .

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## TEXTILE FOUNDATION RENEWS SUPPORT OF RESEARCH COMMITTEE

At a meeting of the Directors of the Textile Foundation held in Washington April 18th, the research work of the A.A.T.C.C. was reviewed and an additional grant of $8,100.00 was made so that the work of its Research Committee might be continued during the coming year.

The special projects for which grants were made are as follows:

Carbonization of Wool.

Wool Scouring—The Effect of Alkalies on Wool.

Fundamental Study of Printing Pastes.

The continued support thus rendered by the Textile Foundation not only encourages the Research Committee in its persistent effort to develop research work in this country as regards textile chemistry, dyeing, bleaching and finishing, but should also have a stimulating and an educational influence upon the nine billion dollar textile industry of America.

The present directors of the Textile Foundation are Franklin W. Hobbs, President, Arlington Mills, Boston, Mass., Chairman; Stuart W. Cramer. President, Cramerton Mills, Cramerton, S. C., Treasurer; Henry A. Wallace, Secretary of Agriculture; Daniel C. Roper, Secretary of Commerce; and Frank D. Cheney, Cheney Brothers, New York, also Edward T. Pickard, Secretary.

Proceedings of the American Association of Textile Chemists and Colorists

# The Manufacture and Uses of Sulfonated and Emulsified Fatty Materials in the Textile Industry*

*By* JOHN J. SOKOLINSKI

*Chief Chemist and Manager, Textile Division, The Arabol Manufacturing Company, New York City*

THE invitation extended me to endeavor to outline in some measure the interesting subject—*"The Manufacture and Uses of Sulfonated and Emulsified Fatty Materials in the Textile Industry"*—and for which I desire to acknowledge my appreciation—covers a field in which the selection of not only the best possible raw materials are essential but also the most desirable for the special purpose.

The selection of such materials must essentially be with a full understanding of the products in which they are to be used and one added asset indeed is a knowledge as to the use to which the finished product is to be put. Such a selection may come through chemical training to determine their value. Most important naturally is the practical combined with a technical knowledge, which, of course, is only obtained after years of experience. Results are possible through research work and also by maintaining a reliable and responsible source of supply of such raw as well as manufactured materials. Such reliable sources of supply control their products and along with their financial responsibility, unnecessary worry on the part of the consumer is greatly diminished, if not *entirely* eliminated. However, times do occur when such sources of supply are not sufficiently large or, being old-fashioned, they feel no so-called technical help is required and adds, in their judgment, unnecessary expense. Having definitely settled on a type material to use for a definite purpose, these standards are then maintained.

In the selection of tallow, only the best quality is used, but for a given purpose due to the peculiarities of the sulfonation process, different types of finished sulfonated tallows may be obtained from the same original material (Sample No. 1†). You will note that it is soft, smooth and of good color and was manufactured mainly for use in pure finish but its function does not end here. It may also be used in other processes. I merely say for pure finish because by comparison you will note the difference in the general appearance of sample No. 2 especially in that it is considerably firmer although the same raw materials are used but a decided change in the procedure of sulfonation was pursued. This sample No. 2 has a high retention value for filling materials and is naturally best used in back-filling or wherever filling materials, such as clay, talc, etc., are required. It does not contain the slightest trace of gum, starches, etc., to give it the high retention properties, and let me say that when it was originally made we met with an interesting experience. I wish to point out a fact which I hope will take away some of the misconception that a sulfonated tallow is merely a sulfonated tallow and that no difference exists between them and that one price suffices for all. The experience I refer to was one in which a user, feeling that all sulfonated tallows were the same, started out using pound for pound and then found that only 2,000 yards of goods (back-filled) were finished with the formal in which this product No. 2 was used, whereas with his former sulfonated tallow, pound for pound, 2,500 yards were finished. Immediately his intention was to discard product No. 2 but on investigation we found that our original contention, namely, that of its high retention value, was further confirmed.

The finished 2,000 yards, which were of a much fuller feel and better finish, we found had approximately the same weight as the original finished 2,500 yards which, by comparison, were light. This merely called for a reduction in the amount of product No. 2 necessary over that originally used which lowered the cost per kettle of size. My illustration here is merely intended to prove that there is a difference between sulfonated tallows, of the same fat content, in their working properties. This also warrants at times, the higher cost due to the difference in raw materials used for a definite purpose but also to the different methods of sulfonation and different purposes for which they were intended also dependant on

*Presented at meeting, Piedmont Section, Oct. 29, 1932.

†Samples referred to were displayed during presentation of paper.

the quantity which, under a given procedure, may be manufactured at one time.

On the contrary, soluble tallows at times made primarily for pure finish are not always suitable for back-filling, for obvious reasons. As for instance, certain types take away from the adhesiveness of the starch, naturally cutting down their retention value and the expected filled goods contain so-called pin holes in which the filling did not function properly.

The sulfonation of castor oils does not possess the same difficulties as the sulfonation of tallows. The most desirable materials are to be used and oftentimes one comes across oils of varying qualities. When the following extract from the U. S. Dispensary is taken into consideration, as to the source of supply of such oils, it is not to be wondered at that this condition prevails—

"The Castor Oil plant, or Palma Chrisit, is a native of India and now extensively cultivated in warmer regions throughout the world. In India there are about seventeen different varieties grown which are grouped into two types.

"1. The one consisting of tall shrubs or small trees, being usually planted as a shade for other crops and yielding large seeds which contain an abundance of inferior oil.

"2. The second includes herbaceous annuals which, while they produce small yields, yield a much better grade of fixed oil."

## CASTOR BEANS

South America India

Photo No. 1

The fact that there are varying grades of Castor beans is indicated in Photo No. 1, means that the same grade of oil is not always obtained. Individual process and care in the extraction of such oils may mean the difference between a high or a low quality oil from the same bean which consequently reverts back to control and the process used. Such unsatisfactory conditions may be brought about by, for example, undue heating which might have a tendency to discolor the oil—or the solvent extraction method and we have on more than one occasion found samples submitted to us an excess of it still prevailing as well as incomplete purification of the oil which would leave in it a high protein content. These facts, naturally, would make such oils unsuitable for the work they were intended. In the sulfonation, of course, mechanical control as well as chemical, is most important. Naturally, when sulfonated castor oil is used in the finish, a more raggy and softer feel is produced; however, by the use of sulfonated tallows the finished material possesses a fuller feel which is only to be expected when the comparison between a solution of castor oil and one of sulfonated tallow is made.

The use of sulfonated castor oil is not entirely confined to the textile industry. While it is not generally known, some "Soapless Shampoos" or to you "Sulfonated Castor Oil" when artistically labeled and neatly packaged are sold in four-ounce bottles at $0.50 or $2.00 per pound. (See Photo No. 2.) So you buyers may well smile broadly when you are buying it at somewhat under ten cents per pound.

Photo No. 2

With reference to emulsified finished products, here is a subject in which the word "Colloidal" covers a multitude of misinformation. You all know that an emulsion in which the fat or oil is in a very fine degree of dispersion is naturally, from an emulsion standpoint, the most satisfactory one. What immediately comes to mind when we speak of a perfect emulsion? Has it ever occurred to you that it might be milk? (Photo No. 3.) Please observe the minute particles of the fat globules, the regular spherical form of almost uncanny uniform size! Did not nature provide a wonderful basis for us to strive for in perfecting a substitute in an emulsion? Frankly, we have accomplished so perfect an emulsion and, in fact, gone nature one better in that we are able to stabilize it. With milk, due to the character of the natural ingredients, deterioration sets in with subsequent separation and souring but with properly prepared synthetic emulsions this objection is readily overcome although nature gives us the original clue for a perfect emulsion.

Just what interest have we in emulsions, especially in the finishing operations? Of course, we have extensive use for them in woolen mills where lubrication, a fine diffusion, ready rinsibility, stability and other necessary

good properties are required for the most economical results. In silk throwing the importance of correct emulsions is well known as also in the exacting processes of the leather industry. Then, too, rayon fibers are processed and finished with such emulsions.

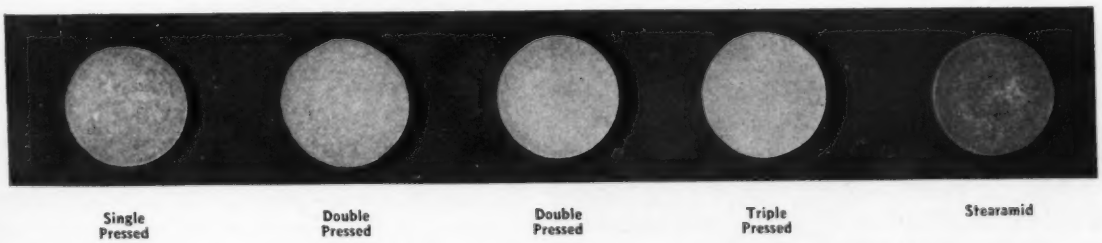
*Sokolinski*

Photo No. 3

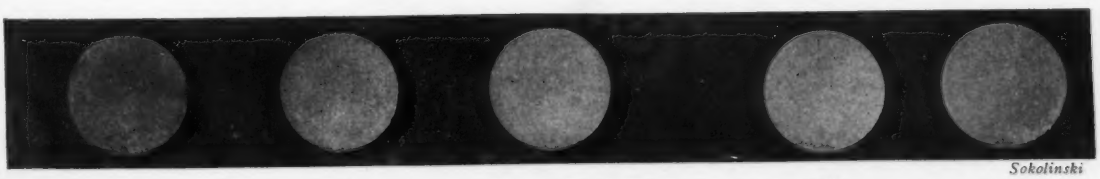
As to finishes, at times called stearic acid emulsions—a word or two about such products. The *correct* manufacture of such a product requires far more experience than one imagines. It must in order to give the most satisfactory and economical results be made from a very good grade of stearic acid. (How many of you gentlemen have had dealings with stearic acid?) Did you find much variation? Well there is, and at times plenty, especially in the imported product. (See Photo No. 4.) If incorrectly manufactured, such finishes readily deteriorate with disastrous results to the goods on which they had been used. This reference to emulsions and fine diffusions and the preparation of them, I will attempt to enlarge on.

The emulsifying properties of stearic acid are practically nil. But when stearic acid is converted into stearamide by replacing the OH radical with Amide or $NH_2$ group entirely different properties are brought about. While Stearamide manufactured by the Amid Duron Company is the basic material of a product called "Duron"—a comparative test was made of stearic acid emulsion, Duron (stearamid) emulsion and soap and borax emulsion. These comparisons were followed by practical tests of products made from this selection. The Duron Stearamide product produced emulsions equal to, if not surpassing, milk, in the fineness of the dispersion of the fat particles. (See Photo No. 5.) We have here a comparison between soap and borax which are often used as an emulsifier under certain conditions. (See Photo No. 6.) Stearic acid emulsion and Duron emulsion containing Stearamide. Sample No. 1 is Olive Oil Duron Emulsion and Sample No. 2 is Stearic Acid Olive Oil emulsion. Sample No. 3 is Soap and Borax Olive Oil emulsion. All under exactly the same conditions. Note how, after a period of 12 hours, the emulsions Nos. 2 and 3 separate. This practically indicates, if not proves, that the stability of the emulsions is in proportion not only to the fineness of the oil globules but to the uniformity of the shape or form of such globules.

DOMESTIC STEARIC ACID




BEESWAX IMPORTED STEARIC ACID

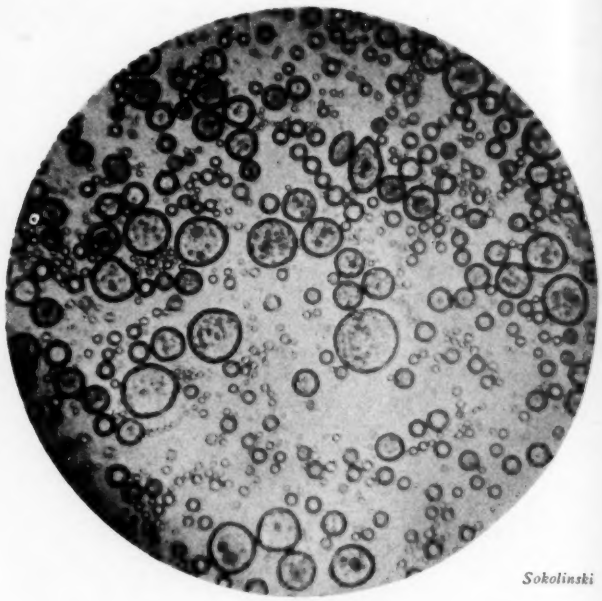



*Sokolinski*

Photo No. 4

*Sokolinski*

Photo No. 5



*Sokolinski*

Photo No. 6

In this instance stearic acid and Stearamide are not necessarily confined to the textile industry. Stearic acid may be had in a definite concentration with an addition of perfume, packaged neatly and might be called "La Piedmont Vanishing Cream." Many standard brands of creams contain the materials referred to and are sold at varying prices usually 25c the 4 oz. jar or $1.00 per pound. (See Photo No. 7.) From this you will readily see that materials suitable for personal beauty application are the self-same materials such as Cream Softeners used for the processing of your textiles and once more the buyer may gleefully smile at the low prices at which he procures such commendable softeners when properly made.

*Sokolinski*

Photo No. 7

Another product which may be classed as possessing some emulsifying properties and which at times is used for the processing of textiles, consists of Beeswax. This product, primarily due to its higher cost, is only used for special requirements. The refined grade of Beeswax is a good emulsifier for mineral oil and greases and exceptional products are made from such combinations—in fact, the best grade of cold creams contain just such a combination as the sample which I prepared for your inspection. Then, of course, there are the other various combinations of waxes, gums and materials for special finishes and individual mill requirements.

If, from the outline of the various manufactured materials made by firms who have, over a period of years built up an enviable reputation for quality material, one takes into consideration that they are made by these reliable manufacturers from the self-same raw materials used for so feminine a selection of personal beauty aids, certainly the user of them in textile processing should feel perfectly safe in applying them to his fabrics as, after all, *is it not the fastidious lady to whom the majority of your finished products are made to appeal?*

Proceedings of the American Association of Textile Chemists and Colorists

# UNEMPLOYMENT REGISTER

Members of this association, who are without employment, should forward to the secretary a statement as to their qualifications and experience. This information will subsequently appear on these pages with an identifying key number. Employers are also requested to file with the secretary any vacancies which may occur in their businesses.—H. C. Chapin, Secretary, Lowell Textile Institute, Lowell, Mass.

Key: A—Laboratory and research; B—Dyeing or printing; C—Finishing; D—Sales; E—Instruction; F—Executive

Note. Persons who have obtained employment should notify the secretary at once. Prospective employers may file vacancies either with the secretary or the American Dyestuff Reporter.

### A-2

*Education*—B.T.C., Lowell Textile Institute, 1932; also course in typing.

*Experience*—None to date, interested in quantitative analysis, experimental dyeing, color matching, dye testing and dye identification. Ability to learn quickly and will go anywhere. 23 years old, woman, single.

### A-5

*Education*—B.T.C., Lowell Textile Institute.

*Experience*—Assistant chemist in carpet mill, dye tester in dye plant, research and analytical work in silk dyeing and finishing plant laboratory, plant chemist and overseer of bleaching in surgical dressing plant, assistant chemist in woolen mill. Age 29. Married.

### A-B-2

*Education*—Lowell Evening Textile School, 1917.

*Experience*—Five years' experience in hosiery dyeing, full fashioned hosiery of silk and cotton and silk, also men's hosiery containing rayon, wool, cotton and celanese. Several years experience in laboratory work. Has also had experience in jig-dyeing of cotton piece goods, slub and top dyeing.

### A-B-C-1

*Education*—Graduate Industrial Chemical Engineer, Pratt Institute—1911.

*Experience*—One year as plant control chemist, 4 years as laboratory chemist with gas company, 13 years as plant chemist with bleaching, dyeing and finishing plant. (Rayon and cotton piece goods). Formulated processes and put them into plant operation, 1 year as chemist and demonstrator for dyestuff company, 1 year as superintendent colorist with print works printing linen and rayon, 1 year as director of testing laboratory for national dry goods concern.

### A-E-2

*Education*—B.T.C., Lowell Textile Institute, 1933.

*Experience*—Assistant instructor in chemistry, Lowell Textile Institute. Member of scholastic honorary fraternity.

### A-E-1

*Education*—Ph.D., Univ. of Illinois, studied chemical engineering at Columbia, licensed chemical engineer, New Jersey.

*Experience*—10 years' experience teaching in colleges, subjects included chemical and textile subjects. Has had broad experience in industrial work including experience in testing materials, research and consulting. Will go anywhere; references.

### B-1

*Education*—Educated and trained in chemistry and calico printing in Glasgow, Scotland.

*Experience*—Has been with large print works as colorist for 13 years producing first class work on cotton, rayon, wool and silk fabrics. References.

### B-2

*Experience*—Boss dyer with one firm for 18 years, divisional supt. at print works for 1 year, in charge of processing and dyeing of cottons and rayons at large bleachery for 6 years. Prefers bleachery in East but will go anywhere. References.

### B-3

*Experience*—Foreman piece dyer for the past 21 years. Can dye the following; celanese, rayon, cotton slacks, wool, silk and mixed fabrics. Has knowledge of finishing and laboratory work.

### B-6

*Education*—Graduate R. I. School of Design.

*Experience*—5 years in bleachery, 7½ years as assistant dyer, 2 years as boss dyer and 3 years as superintendent of dyeing and finishing. Married, 33 years old. References.

### B-7

*Experience*—Eight years as boss dyer on skeins and ribbons. Over ten years as chemist and head dyer for a large hosiery mill. Experienced on Silk, cotton, rayon and wool in skeins, ribbons, piece goods and all kinds of mixtures. Willing to go anywhere. Not afraid to work or face responsibility. Can handle help efficiently.

### B-8

*Education*—Chemistry and Dyeing Department, Philadelphia Textile School.

*Experience*—Eleven years experience as chemist and boss dyer on the following: woolen, worsted and cotton

yarn; woolen, worsted and union piece dyes on both ladies' and men's wear; wool, cotton, shoddy and mohair raw stock. Age 33, married, will go anywhere. References.

**B-9**

*Experience*—Hosiery dyer with fifteen years' experience on high grade silk hosiery; familiar with all types of machines. Age 43, married. Will go anywhere.

**B-10**

*Experience*—Ten years in top dyeing for fancy men's wear trade, knitting trade and sports wear; also piece dyeings on men's wear, crepes, sports flannels and tropical suitings; also several years association with commission dyeing trade doing tops, worsted skeins, cotton skeins, piece dyes, peroxide bleaching, naphthols, mohair plushes and imitation caracul cloths. Familiar with many types of machines. 38 years old, single with dependents.

**B-11**

*Education*—B.T.C., Lowell Textile Institute, 1926.

*Experience*—1 year dyeing raw stock with chrome colors, 6 years dyeing hosiery on all fiber combinations and cotton, wool and merino yarns in Franklin Process machines, several years experience in garment dyeing. Age 29. Married. References.

**B-12**

*Education*—2 years days at N. Y. U. and 3 years nights studying chemical engineering.

*Experience*—1½ years asst. colorist, 5½ years colorist. Experienced on vats, commercial and fast colors on cotton and cotton-rayon mixtures. References; age 29; married.

**F-1**

*Education*—Textile Institute, Alexander Hamilton Inst., Extension work at Brown Univ., working knowledge of German.

*Experience*—Has had executive departmental work with all types of textiles manufacturers. Acquainted with all types of textile machinery, dyestuff application, laboratory practice, cost methods, and checking methods and processes. References.

## APRIL MEETING, PHILADELPHIA SECTION

THE Spring meeting of the Philadelphia Section was held at the Penn Athletic Club, Philadelphia, on Friday evening, April 20th, 1934. The usual informal dinner preceded the meeting proper. There were 70 members and guests present.

Plans for the annual outing of the section were announced by the chairman and discussed by the group. The outing will take place on Friday, June 15th, 1934, at the Torresdale Golf Club, Philadelphia. Golf and other activities will be available to members and guests, and prizes and entertainment will be provided.

Mr. H. S. Travis, for the nominating committee, announced that the following nominations for the year 1934-35 had been made:

Chairman: R. A. Bruce.
Vice-chairman: R. E. Sullivan.
Treasurer: John T. Gibbons.
Secretary: C. A. Seibert.
Sectional Committee: D. McGowan, Jr., R. M. Ritter, W. G. Hamlen, Jr., W. A. Stringfellow.
Councilor: E. C. Knaeble.
Delegate to Research Committee: H. B. Dohner.
Chairman Emeritus: E. C. Bertolet.

These nominations will be ballotted upon at the annual meeting.

A motion was passed to communicate with our Secretary, Chas. A. Seibert, expressing the Section's best wishes for a speedy return to health.

Mr. A. E. Sampson of the Calco Chemical Co. then addressed the meeting on the subject, "Standardization Control in Dyestuff Manufacture."

Following this Mr. W. W. Bray, Director of Textile Research for Procter & Gamble Co., presented a paper entitled "Silk Soaking for Direct Knitting."

Mr. A. E. Jones of the Alco Chemical Co. contributed several selections on the piano during the course of the dinner.

Respectfully submitted,
W. A. STRINGFELLOW,
*Acting Secretary*

## APPLICATIONS FOR MEMBERSHIP

### *Active*

*Miles A. Dahlen*—Research Chemist, E. I. du Pont de Nemours & Co., Wilmington. Sponsors: E. F. Hitch, C. A. Seibert.

*Herbert P. Ford*—Salesman, Ciba Co., Montreal. Sponsors: W. E. Mitchell, E. W. Pierce.

*Harry L. Miller*—Technical Director, Quaker Chemical Products Corp., Conshohocken, Pa. Sponsors: R. J. Beauregard, James Yates.

*A. E. Raimo*—Salesman, John Campbell & Co., Philadelphia, Pa. Sponsors: G. C. Lommel, E. C. Bertolet.

*Edward J. Siegrist*—Dye Superintendent, Holeproof Hosiery Co., Milwaukee, Wis. Sponsors: E. F. Hempel, W. S. Paddock.

*H. Gillespie Smith*—Salesman, Calco Chemical Co., Charlotte, N. C. Sponsors: Harold Schroeder, Homer Whelchel.

*Alan F. Thompson*—Chemist and Chief Dyer, Knitter's Limited, Lindsay, Ontario, Canada. Sponsors: W. H. Turner, T. Jackson.

*Robert Barrington Weatherston*—Dyer, Toronto Dyeing & Finishing Works, Toronto, Ontario, Canada. Sponsors: W. H. Turner, T. Jackson.

### *Associate*

*L. L. Griffiths, Jr.*—Salesman, and Technician in Application of Dyes in Paper, Kalamazoo, Mich.

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DYESTUFF
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## REVIVAL

"IF YOU can't get public support, you just can't make the thing go." Thus spoke General Johnson in a message delivered to the recent convention of the Chamber of Commerce of the United States. Such a statement, though not exceptionally profound, is nevertheless full of wisdom. For an example we point as usual to the popularly discussed rise and fall of prohibition, with its joyfully heralded repeal. Whether or not it was a good thing for the welfare of our citizenry or not is beside the point—the moral of the story of the great American drought is that when it lacked support it fell by the wayside. If it had been possible to revive interest and belief in prohibition it might still be impossible to read the public advertisements of the vendors of liquid appetizers. Which all brings us to the reason for the above remark of the General.

It seems that "due to a lapse of public enthusiasm over the codes" it has become necessary to formulate plans to revive interest in them and although "the details of the campaign are still a little obscure, we are working on it every day and will have it ready within the next thirty to sixty days." In spite of this lapse of enthusiasm over the codes there still seems cause for rejoicing according to the words of Henry I. Harriman, president of the chamber, who said: "Economic horizons have indeed brightened. The normal gross income of those engaged in agriculture is between ten and eleven billions. In 1932 it sank to a sum barely in excess of five billions, but in 1933 it rose to between six and seven billions. In this same period, farm prices rose from an index number of 40 to an index number of 60.

"General business has also improved, as is well indicated by the index figure of business activity which rose from 61.7 in February, 1933, to 78.5 in March of the present year . . . But the most hopeful statistical figure is that of unemployment. The roll of the men and women who were out of work in February, 1933, included nearly 13,000,000 people.

"Today it is not even 7,000,000, and from this number must be deducted about 3,000,000 who are normally out of work, leaving the present excess of the unemployed around 4,000,000 of our people."

Now we wonder just what the cause of this "lapse of enthusiasm" may be. Is it due to a lack of faith in the NRA as a whole or is it due to some other cause? It has been suggested that people are far more concerned with improved business conditions than they are in the proper functioning and support of the various codes. If this be true, the avowed purpose of the NRA to provide a basis for future business conduct as well as for the duration of the depression (or until it expires as scheduled on June 16, 1935) looks as if it had little chance for fulfillment. If people are already losing enthusiasm for the codes with the small amount of business improvement to date what chance would there be for gaining back that enthusiasm in a more improved market? This suggestion may be all wrong and probably there is some other explanation for the lapse of enthusiasm that would give the instigators of the NRA more hope for the indefinite continuance of its policies.

It seems strange that there should be this absence of spirit even before many codes are still finally adopted. It evidently shows that there is a weak link in the structure somewhere and undoubtedly that link is "public opinion." Just what the plans are for the campaign to restore the public confidence in the code system has not as yet been made public. We would venture to say, however, that it must be something which shall be free from the type of ballyhoo which is generally used to bring about a rise in the public spirit. It must be something that is sound in reason and expected result. The novelty of "flying the blue eagle" has worn off and whatever new is offered must have a real definite purpose other than merely display. People have come down to a sound reasoning basis in regard to the NRA and its codes. Experimentation in its early stages is attractive but after the period of trial has passed something more tangible and substantial must be offered to catch the public fancy. "If you can't get public support, you just can't make the thing go" means that you have to have the support of capital, labor and the administration alike.

## TEXTILE FOUNDATION NEWS

Results of a six months' study of educational facilities and methods of training men for the textile industry have just been published by the Textile Foundation. This practical report, now available from the Foundation, surveys the courses offered by eleven textile engineering schools or institutes with a view to the requirements of a nine billion dollar industry for trained personnel.

The survey was conducted by Frederick M. Feiker, a graduate of Worchester Polytechnic Institute and now Executive Secretary of the American Engineering Council of Washington. His advisory committee consisted of Dr. Karl T. Compton, President of Massachusetts Institute of Technology, Dr. E. C. Brooks, Vice-President of the University of North Carolina, and R. E. Doherty, Dean of the School of Engineering, Yale University.

Opportunities for trained men in the textile industry are reviewed in the report, which also discusses the specialized training necessary to equip men to cope with the problems of the industry, as well as the opportunity for textile schools to meet the new requirements for trained personnel. The hearty cooperation of the various textile schools and of numerous executives of the textile industry has aided greatly in the preparation of this report for the Textile Foundation. Charts showing the relation of component parts of the textile industry and trade, together with comparisons of the courses of training offered by the various textile schools, afford a valuable supplement to the textual presentation.

Three of the textile schools are located in Massachusetts, two in Texas, and one each in Rhode Island, Pennsylvania, North Carolina, South Carolina, Georgia and Alabama. The report contains a brief history of the development of these textile schools, an analysis of the educational significance of the present trends in the industry, several proposals for matching present industrial trends with present educational methods, and numerous suggestions for training in the field of economics, industrial management and sales research. The selection of raw materials, manufacturing and marketing problems issue a distinct challenge to training in industrial technique, management and marketing, it is maintained.

The Textile Foundation, Commerce Building, Washington, D. C., was organized four years ago for scientific and economic research for the benefit and development of the textile industry and its allied branches, including that of production of raw materials.

Edward T. Pickard is Secretary of the Foundation and will welcome any inquiry concerning conditions under which the present study of textile education is available.

## General Releases

The General Dyestuff Corporation is sending out circulars on the following products. Copies of these bulletins may be secured on request.

*Diazo Brilliant Scarlet ROA Extra*—a new product of the General Aniline Works which when dyed in the usual way from a salt or Glauber's salt bath and diazotized and developed with Beta Naphtol is said to produce full red shades of good fastness to washing and dischargeability. Fastness properties to alkali, ironing and rubbing are claimed to be very good but the fastness to light is only moderate.

*Alizarine Sky Blue FFG*—a new acid dyestuff of bright greenish blue shade which is said to level well from a Glauber's salt acetic acid bath and to possess very good fastness to light. It is further claimed that it is of good fastness to water, rubbing, hot pressing, alkali and stoving. It is said that the fastness to washing is fairly good and that it will also stand moderate milling. It is recommended by the manufacturer for direct printing on wool, pure and tin-weighted silk.

*Palatine Fast Red BEN*—is said to be distinguished by its very level dyeing properties which, it is said, makes it an excellent shading color for combination shades. It is further claimed that it possesses very good fastness to light and good fastness to washing, water and salt water, as well as to rubbing, hot pressing, perspiration, alkali and carbonizing. It is recommended by the manufacturers for the dyeing of woolen piece goods for men's wear and ladies' dress goods and for carpet, hosiery and knitting yarns.

*Naphtol AS-LG and Naphtol AS-L3G*—two new products which in conjunction with Fast Scarlet 2G are said to produce clear yellows of red and green cast which, it is claimed, possess outstanding fastness properties to light, washing, chlorine, and peroxide bleaching. It is further claimed that both naphtols are highly substantive, can be nearly exhausted by common salt, withstand a common salt rinse after impregnation, can be applied for machine dyeing, are easily soluble with alcohol and with addition of dispersing agents provide stable solutions.

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## Price List

The quarterly price list of "R. & H. Chemicals for all industries" has just been issued by the R. & H. Chemicals Department of E. I. du Pont de Nemours & Company, Wilmington, Delaware.

This informative booklet not only quotes current prices of the products, but also contains pages of descriptions of such leaders as Artic, a refrigerant; non-flammable solvents; Duozinc for planting purposes; feldspars; peroxides; P.A.C. formaldehyde and ceramic colors and other ceramic materials. The various chemicals discussed include those required in the chemical, metal, textile, rubber, leather, oil, ceramic and some other industries. In all, nearly 200 different chemical products receive mention or more or less detailed description.

# MODERN OFFICES

At Right—Sales Office at the New Headquarters of American Cyanamid.

# IN A MODERN BUILDING

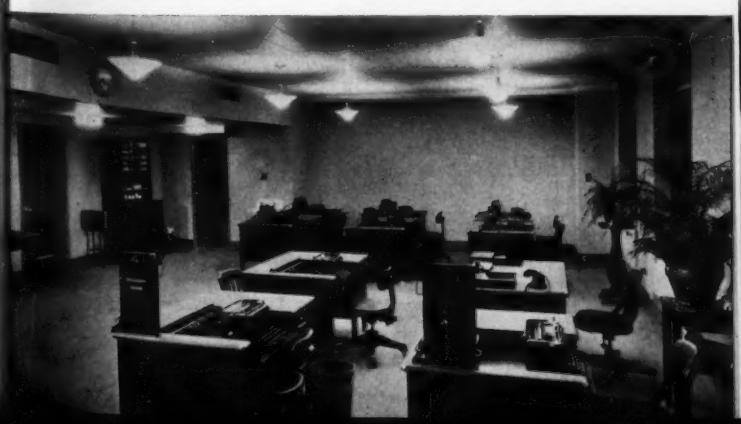
THE arrival of the American Cyanamid Company into its new offices at 30 Rockefeller Plaza represented the biggest moving job to date into Rockefeller Center. More than four hundred vanloads were required to move the American Cyanamid Company, the American Cyanamid & Chemical Corporation and subsidiaries to their new offices. However, this was all accomplished in a week-end and the new headquarters are a model of modern business layout.

Instead of being spread over twenty-eight floors as they were previously, the new quarters are concentrated on but four. All of the executive offices, together with the closely affiliated technical and patent departments, are together. The sales department, the accounting division and the engineering staff are each grouped on separate floors. A specially built private stairway leading up from a spacious and attractive foyer connects all of these floors with each other.

Mindful of the health of the persons working, all of these offices have been air-conditioned and the temperature and air circulation are automatically maintained at the proper point. Soundproof ceilings absorb all undesirable noises generally prevalent in most offices thus insuring quiet and privacy even in the general offices. Among the many details which will contribute to efficient and organized office work are modern light fixtures so designed as to provide maximum illumination with a minimum of eye-strain; new, simple and practical desks; recessed drinking fountains at convenient points and individual decorations for the larger executive offices.

The new offices of this corporation reflect the growth and organization during the past twenty-seven years. The American Cyanamid Company, which is the parent of the present corporation, was organized in 1907 by the late Frank S. Washburn who secured in Europe the American and Canadian rights to the cyanamid process for the fixation of atmospheric nitrogen for fertilizer and chemical purposes. The first plant was erected at Niagara Falls,

At Right—An executive office. Below—Stenographers' room showing air conditioning at upper left and sound-proofed ceiling.



Ontario. From this beginning, the growth of the company culminated on July 1, 1932, in the formation of the American Cyanamid & Chemical Corporation which consolidated the activities of its subsidiaries in the chemical field. The companies involved in this corporation were as follows: American Cyanamid Company (Industrial Chemical Division), American Cyanamid Sales Company, The Kalbfleisch Corporation, A. Klipstein & Co., Inc., John C. Wiarda & Co., Inc., Superior Chemical Co., Inc., Fumigators Supply Company, American Powder Company, The Selden Company, Owl Fumigating Corporation, and The Kalbfleisch Corporation of Surinam. Since that time even further expansion has taken place. Among the persons employed by the American Cyanamid Company at the time of its inception, the only one remaining is K. F. Cooper who is now a vice-president of the present corporation.

The present offices are occupied by the American Cyanamid Company, American Cyanamid & Chemical Corporation and the following subsidiaries: American Cyanamid Sales Company, American Powder Company, Amalgamated Phosphate Company, Arizona Chemical Company, Beetleware Corporation, Chemical Construction Corporation, Chemical Engineering Corporation, General Explosives Corporation, A. Klipstein & Company, Inc., Maryland Chemical Company, Inc., Owl Fumigating Corporation, Rezyl Corporation, Structural Gypsum Corporation, Synthetic Plastics Company, Inc., The Kalbfleisch Corporation and The Selden Company.

According to those who are responsible for this well-organized, foresighted move into the new quarters it will contribute, directly and indirectly, to smoother operation of the business of American Cyanamid.

## COLGATE MOVES TO JERSEY CITY

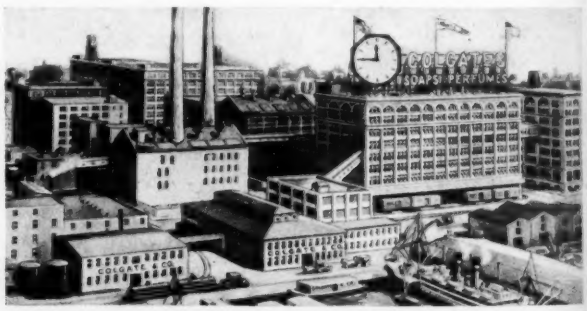
One of the important business migrations in recent years occurred upon the completion of the removal of the Colgate-Palmolive-Peet Co. from Chicago to Jersey City. This action was the result of the decision of S. Bayard Colgate, president of the company, that "increased efficiency in the management of the business, as well as savings in time and money" should result from moving the main offices of the corporation, a two-story addition was constructed at the Jersey City plant of the firm, and new offices made available. A total of more than 400 people, including workers and their families, were involved in the trek East.

Up until 1928, Jersey City was the headquarters of Colgate & Co. but at the time of the merger (Colgate-Palmolive-Peet) the headquarters were moved to Chicago. The Colgate plant, on the Jersey City waterfront, is the company's largest and is made famous by its huge clock.

S. Bayard Colgate is one of the fourth generation in direct descent from the founder of the firm. The Colgates are English by origin and in the year 1795 one

**Birthplace in Dutch Street, "Little old New York," where in 1806 William Colgate first manufactured and sold soap.**

Robert Colgate who was a radical sympathizer with America in its struggle for liberty was forced to flee to America. William Colgate, son of Robert, began his career as a soap maker in Baltimore. In two years he came to New York and entered the employ of John Slidell & Co., tallow chandlers, and eventually became business manager. He embarked in business for himself at the age of 23 and started the manufacture of soap. In 1845 he started a starch plant in Jersey City and two years later the main plant of Colgate Co. was also moved there, which has since been its permanent home.




**Under the Big Clock. The giant Colgate timepiece atop the Jersey plant now keeps time for headquarters, for which a two story addition has been built to provide new offices.**

William Colgate died at the age of 74 in 1857. After his death the name was change to Colgate and Co. and Samuel, his son, carried on the business. Samuel died in 1897 after 52 years of service, leaving his sons in control. Sidney Colgate was the last president of Colgate & Co. and became chairman of the board at the time of the merger with Palmolive-Peet. And now another Colgate is at the head of the business.

## DETECTION OF COLOR DIFFERENCES

(Continued from page 252)

per cent at the red end of the spectrum. This difference is evidently significant since the color analyzer can be depended upon to reproduce the curves to within a fraction of the width of the penline. Hence, we may conclude that there is no difficulty in determining by the spectrophotometric method a color difference that is quite imperceptible to the unaided eye.

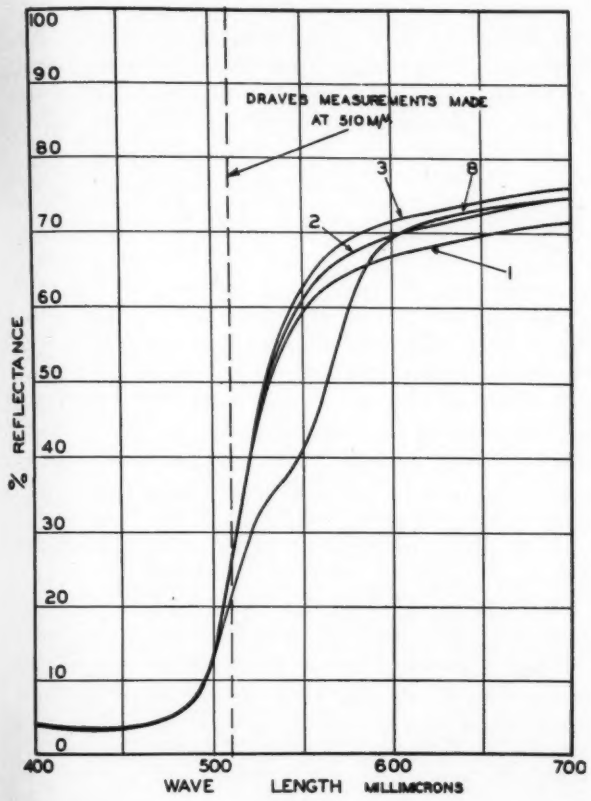



Fig. 1

It is interesting to note that Draves described the difference between samples 1 and 3 as a difference in hue. This judgment was evidently based upon his knowledge of the effect produced by larger quantities of the red dye. Referring to curve 8 in Fig. 1, it will be seen that 0.01 per cent of the red dye does definitely shift the hue toward the red end of the spectrum. The curves in Fig. 1 have been converted, according to the Standard Observer and Coordinate System for Colorimetry outlined by Judd[2], into dominant wavelength, colorimetric purity, and luminosity (brightness) with the results given in Table II.

[2] J.O.S.A., *23*, 359 (1933).

**Table II**

| Sample | Dominant Wavelength ($m\mu$) | Colorimetric Purity (%) | Luminosity (%) |
|---|---|---|---|
| 1 | 577 | 92 | 54.2 |
| 2 | 577 | 92 | 55.9 |
| 3 | 577 | 92 | 57.3 |
| 8 | 582 | 90 | 47.1 |

It will be seen that the principal effect of adding a small amount of Crocein Scarlet Conc. is to increase the brightness of the swatch and that larger quantities are required to produce a shift in the hue (dominant wavelength). Hence, although Draves was able to distinguish between samples 1 and 3 by merely looking at them, he was unable to correctly state the manner in which they differed.

The anomalous effect produced by small amounts of the red dye (curves 2 and 3) would undoubtedly have been detected by Draves, even with his visual spectrophotometer, had he continued his observations throughout the spectrum. This effect is a definite increase in reflectance at the red end of the spectrum when small amounts of Crocein Scarlet Conc. are added to Tartrazine O on wool. This is entirely contrary to the effect that would be expected and so far as we know has not been previously recorded. That the above curves do represent

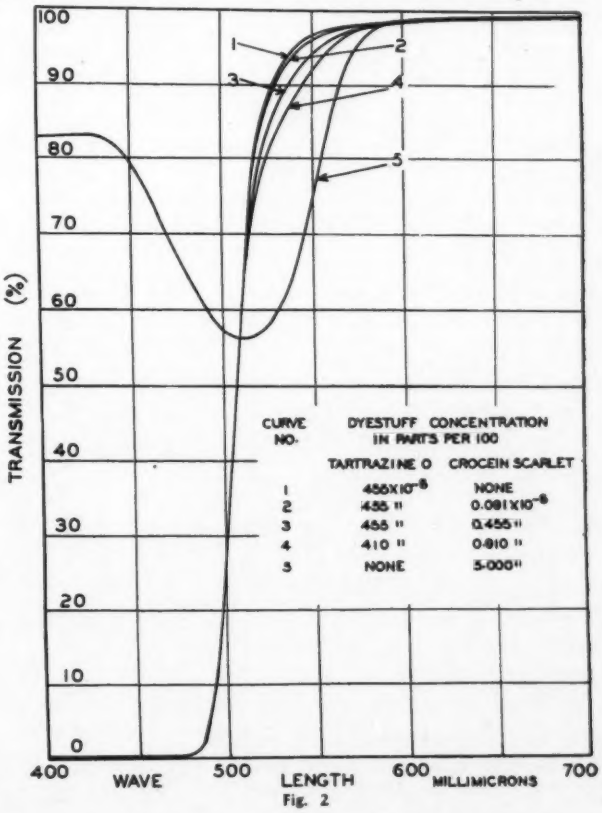



Fig. 2

an anomalous behavior of these dyestuffs will be apparent from Fig. 2. Here it is seen that successive small additions of the red dye to a solution of the yellow dye lower

the transmission in the manner that would be anticipated from Beer's law. Since these same additions actually raised the reflectance of the dyed wool, it must be concluded that this peculiar behavior is undoubtedly connected with the manner in which these dyes are taken up by the cloth. An explanation of this inconsistency will not be attempted at this time, since the purpose of this paper is merely to show the applicability of the spectrophotometric method to the detection of small color differences. It is hoped that the results given here will definitely serve to remove any prejudice that may have been formed against the precision of the spectrophotometric method and will encourage other investigators to apply it to their particular problems of color measurement.

## BOOK REVIEW

***Reaction Tables of the Vat Dyestuffs and Indigosols.*** *Reactionstabelle der Kuepenfarbstoffe u. Indigosole, von Dr. E. Herzog, Winterthur-Schweiz, pp. 32, Verlag B. Wepf u. Cie, Basel,* 1933.

The above work presents a method for the determination of the dyestuffs of the classes mentioned, employed upon goods to be matched—one of the most difficult and vexing tasks in all color-chemistry.

The reactions employed are, as would be expected, entirely color-reactions, and of course, qualitative (more than that would hardly be useful). The general method employed is as follows:— a sample of the goods is treated, (a) with concentrated sulfuric acid, (b) with hydrosulfite and alkali, (c) each of these test-solutions, after noting the color, is treated with mineral acid. The resultant colors are classified, against each dyestuff, under numbers corresponding to a range of 0 = decolorized, to 9 = gray or black. Rather ingeniously, the author fixes any dyestuff in his classification, by taking the "color-number" of the sulfuric acid test as in the units, that of the hydrosulfite test as in the tens, and that of (c) as in the hundredths, thereby giving each dyestuff both a fixed place in the tabulation, and also, by interpretation of the number, an instant key to the color-reactions which the dyestuff will yield.

It is interesting to note that the author gives the color tones, as far as possible, as pure tones, including the broken tones derived from them, and states that he does so because of the indefinite state of our color terminology, and on psychological grounds also. (The reviewer feels that, with so many explanatory, laudatory, and expository articles appearing of late years, regarding the Ostwald color theory, there may be suspected some feeling on the part of its devotees that there is a need for recommending it so strongly—that, if it really were at last the solution of our difficulties, we should not need the persistent recommendation of it to our attention.) Where there seems to be any possibility of a given color being interpreted differently by different observers, the author has ranged it under each possible classification.

The author first published the present method in a shorter form in 1932, though it had been in preparation and experimental use for years before. He has brought it up to the most recent possible date, with the cooperation of the I.G. laboratories (in which, we believe, he worked and studied for years), and has included not only all the dyestuffs of German manufacture, but also the Swiss and French dyestuffs.

The little work seems to be of great value to dyers and dye chemists. It is thoroughly well worked out, and Dr. Herzog deserves to be thanked for the long and weary labor which it must have cost him. We should like to see the scope of his book extended to include dyestuffs of British and American manufacture as well, or, at least, to persuade him to prepare a companion volume covering the American colors alone, if it is not feasible at present to extend the method so widely.

FREDERICK S. BEATTIE

## Meeting of S. O. C. I.

The system which supplies the islands of Bermuda with fresh water was the subject of discussion at a meeting of the American Section of the Society of Chemical Industry, held jointly with the American Chemical Society, The Electrochemical Society and the Societe de Chimie Industrielle on May 4th at the Chemists' Club, 52 East 41st Street, New York City.

Dr. W. D. Turner, of Columbia University, who developed the system, presented a paper entitled "The Bermuda Water Works," in which he described the special installation made necessary by the soil conditions peculiar to the islands.

Until 1929 Bermuda had to depend entirely for fresh water on importations from New York or on rain water collected from the roofs or specially constructed catchments. This was necessary because no method had been found to collect underground fresh water without salt contamination from the sea water which permeated the coral structure of the islands.

Dr. Turner, on a yisit to the islands, conceived the idea of applying horizontal wells or infiltration galleries for collecting the surface waters. The system produced water free from salt but very hard, due to percolation through the coral sandstone. This system was therefore supplemented by an extensive softening process, and the resultant soft, fresh, pure water is now being produced and distributed throughout the colony in a complete system of asbestos water mains designed to be resistant to the serious corrosion conditions existing in these subtropical sea islands.

In a discussion of the paper Mr. S. B. Applebaum of the Permutit Co. made some further remarks about the water softening process used, and Mr. P. D. Mallay of the Johns Manville Co. gave further details concerning asbestos water mains, which are being manufactured by his company at the present time.

# OPEN FORUM

**Rules under which this department of the REPORTER is conducted are as follows:**

**1. Anyone who has a technical problem on which he would like advice may submit it to the Reporter and it will be published in the first available issue.**

**2. Any reader who feels that he has a solution of the problem may forward his reply to us and if we feel that the reply is suitable it will be published in a succeeding issue.**

**3. For each such reply published the Reporter will pay a minimum of $2.**

**4. In case there is more than one answer to the same question, the one covering the subject in the most complete and authentic manner will be published, or if two answers are sufficiently different both will be published. If two answers are considered equally good, the one first received will be given priority.**

**5. The Reporter will assume no responsibility whatsoever for the accuracy of the answers submitted—it is simply offering a vehicle for the public expression of its readers' opinions.**

**6. Both the questioner and answerer must send in his complete name and address. When requested we will publish only the initials or other identifying insignia.**

## *Answers*

6.—Can you give me a good working method stating amounts of materials, temperatures, and procedure for weighting rayon (viscose) knit goods? What type of equipment is best suited for the purpose?

Should the goods be bleached before weighting or will the advantage of bleaching be lost by subsequent weighting processing? What precautions are necessary in dyeing? How permanent is the weighting, i.e., to repeated washing of the cloth when made into a garment?

Does the gain in weight of say 15% show much advantage? **R. C. B.**

***Answer*— The above letter contains so many questions and raises a subject that has been the center of so much controversy that we feel it necessary to answer all questions in detail.**

**We recognize that finishing is a definite and desirable part of the textile industry. It is right and just that fabrics should be displayed at their best to the ultimate purchaser. The addition of proper quantities of finishing materials enhances the value of the merchandise and in many instances adds a tangible value to the fabric.**

**Such finishing of rayon knit goods, as comes under this heading, we definitely favor.**

**Prior to approximately a year ago the application of finishing and weighting materials to rayon was so overdone and abused that there resulted a real, though silent, buyers' strike. Volume of sales fell because buyers of this merchandise, housewives, refused to be fooled more than once on over-weighted and overstretched merchandise that after one washing bore very little resemblance to the fine appearing garment they originally purchased.**

**As is usually the case the condition righted itself somewhat—manufacturers were forced to make better fabric or go out of business.**

**We feel it necessary to add here that many manufacturers of this type of fabric made good quality of merchandise throughout the entire unfortunate orgy of over-weighting.**

**At present very little rayon fabric is weighted beyond 3% of the weight of the cellulose content.**

**However, one angle of this practice is still somewhat vicious in nature. This is the deliberate delustering of the merchandise, using small amounts of pigment and pigment-like materials applied to the outside of the fabric in conjunction with other finishing compounds in such a way that the resultant fabric presents a very excellent appearance that is radically changed upon the first washing.**

**This practice is followed only upon fabrics made from bright luster or semi-dull yarns. Its purpose is to produce from these yarns a fabric, practically duplicating in appearance, a fabric made from the more expensive yarns delustered internally with pigment.**

**The weighting of circular knit rayon fabric gives the seller of the merchandise a distinct monetary value as the fabric is sold by the pound rather than by the yard. This method of selling has no doubt contributed somewhat to the abuses of over-weighting that, as we stated above, died out approximately a year ago.**

**With respect to weighting materials—there are two methods that have been successfully used, one being the application of weighting material in the dye bath, the other being the application of weighting materials on the Tube-Tex finish range developed by the Tubular Textile Machinery Corporation and marketed by H. W. Butterworth Company. These machines, built to process circular knit rayon fabric in such a way that finished fabric shrinks during washing much less than would otherwise be the case and to give the fabric certain other characteristics that have no direct bearing on your question, have been used by certain firms to apply objectionable quantities of finish as well as to apply surface delusterants that produce fabrics identical in appearance and feel with fabrics made from internally delustered rayons. Excessive weighting is at the present time absolutely barred by the manufacturers of these machines who lease them rather than sell and therefore are in a position to prevent abuses of this type. Surface delustering has not yet been banned though it has been thoroughly criticized from many quarters.**

**The materials used are pigments and pigment-like substances such as clay, oils, glycerine, etc.**

**D. C. D.**

### Meeting of T. C. C. A.

At the annual business meeting of the Textile Color Card Association, held on April 19th at the headquarters of the Association, 200 Madison Avenue, all directors were re-elected for the coming year, as follows: Charles Pinnell, Roy E. Tilles, Armand Schwab, Alfred L. Simon, W. Robert Blum, William Hand, Edward S. Johnson and J. Laird Schober.

Allan C. Jacobson of J. P. Stevens & Co. was elected a director to fill the vacancy caused by the resignation of Albert L. Gifford of the Worumbo Company. Mr. Jacobson will represent the woolen industry on the color organization's Board of Directors.

At a meeting of the directors held immediately after, all present officers were re-elected as follows:

Charles Pinnell, President, Fred Butterfield & Co.; Roy E. Tilles, First Vice-President, Gotham Silk Hosiery Co.; Armand Schwab, Second Vice-President, Armand Schwab & Co.; Alfred L. Simon, Treasurer, Alfred L. Simon & Co. Margaret Haydon Rorke was re-elected secretary and managing director.

### Changes in Evening Textile Courses

Columbia University, Extension Division, announces the following changes in the Evening Textile Courses, effective next Fall:

Course e Z 1 dealing with cotton manufacture will be given on Monday evenings instead of Friday evenings from 7:30 to 9:20 P.M. in Room 110 B, School of Mines.

Course e Z 2 on Cotton Goods Converting, given in the Spring session will also be changed to Monday instead of Friday evenings from 7:30 to 9:20 P.M.

Course e Z 5 and e Z 6 dealing with design in Textiles will be changed from Friday to Monday evenings also.

These changes will be of interest to those in the trade, who have been unable to take such courses on Friday evenings. All other courses are being continued at the usual days and hours and have been well attended.

### Annual Outing, S. O. C. M. A.

The annual outing of the Synthetic Organic Chemical Manufacturers Association will be held on Thursday, Friday and Saturday, June 7th, 8th, and 9th at the Skytop Lodge in the Poconos, Skytop, Pa. On June 7th the Annual Meeting of the Manufacturing Chemists' Association will be held in the morning. In the evening of the same day the M.C.A. will be the hosts at the Union Dinner. On June 8th the Annual S.O.C.M.A. Golf Tournament will be held with prizes awarded to the winners. No special events are planned for the 9th.

### Southern Chemical Corporation

American Cyanamid Company and Pittsburgh Plate Glass Company jointly have formed the Southern Chemical Corporation, with a Delaware charter, and have qualified to do business in Texas. The new corporation will produce a varied line of chemicals in connection with the operation of the alkali plant being constructed at Corpus Christi, Texas, by Southern Alkali Corporation, also jointly owned by the two above mentioned companies.

The officers of Southern Chemical Corporation are as follows:

Chairman, W. B. Bell; President, H. L. Derby; Vice-Presidents, C. M. Brown, K. F. Cooper, H. A. Galt, H. S. Wherrett; Treasurer, R. C. Gaugler; Assistant Treasurers, A. B. Savage, K. C. Towe; Secretary, W. P. Sturtevant; Assistant Secretaries, J. H. Heroy, G. R. Martin.

It is expected that the plant at Corpus Christi, which has been under construction for something over a year, will be in operation this fall. A thirty-foot channel is being dredged to the private dock which will enable ocean-going vessels to load and unload at the plant and will greatly facilitate handling the export and coastwise business which Southern Chemical Corporation expects to transact.

## CLASSIFIED

**The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.**

### POSITION WANTED

Colorist-Chemist. Six years' experience in dyestuff and textile fields. Specialist on vat dyes. Experienced in sulfonated oils, textile finishes and sizes. Columbia University trained. Salary secondary to advancement. Must be within commuting distance of New York City. Write Box No. 811, American Dyestuff Reporter, 440 Fourth Avenue, New York, N. Y.

SALESMAN—Oils, Softeners and Finishing materials, with following and car. Good position for right man. Give details. New York, New Jersey, Pennsylvania and Connecticut. Write Box No. 812, American Dyestuff Reporter, 440 Fourth Avenue, New York, N. Y.

FOREMAN—Finishing, folding and packing New England cotton plants 20 years. New Jersey and New York City silk plants 10 years. Plain and prints, taffeta and crepes—the finish you want. Understand unique method. Practical experience. American born, Lowell, Mass. Henry F. Carr, R.F.D. No. 1, Billerica, Mass.